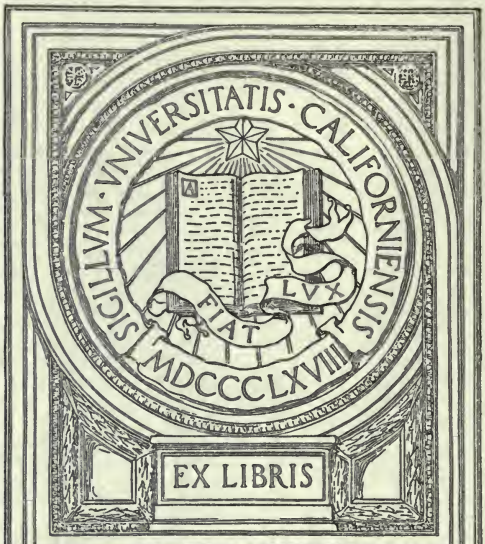
THE UTILITY OF

ALL KINDS OF

HIGHER SCHOOLING

AN INVESTIGATION BY

R. T. CRANE



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UNIV. OF
CALIFORNIA

THE UTILITY OF
ALL KINDS OF
HIGHER SCHOOLING

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R. T. CRANE

CHICAGO, 1909

UNIV OF
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PREFACE.

Part One of this book was published first in 1902, and so much interest was shown in the original edition that a second printing was needed in 1903 — this edition giving results of my further investigations as to the utility of an academic or classical education for young men who have to earn their own living, and who expect to pursue a commercial or industrial career.

As my position on this subject seemed to meet with general endorsement, and long experience and observation had given me the impression that the value of nearly all other branches of higher education was greatly overestimated, I concluded to go into a general investigation of the subject, in order to ascertain just what the facts are, and have investigated and studied the following:

Technical Education in Manufacturing.
Technical Education in Civil Engineering.
Technical Education in Electrical Engineering.
Agricultural Colleges.
Manual Training in the High Schools.
Business Education.
Medical Education.
Scientific Education.
Rural Schools.

The results of these investigations are now added to the third edition of Part One, as Part Two of the present book.

I have undertaken all of my investigations just as I would go about any piece of mechanical work, or as I would consider any business proposition — systematically, deliberately, and with the purpose of getting to the point by the shortest way possible, and it will be found that I have used no immaterial matter and no unnecessary words.

R. T. C.

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PART ONE

THE UTILITY OF AN ACADEMIC OR CLASSICAL EDUCATION FOR YOUNG MEN WHO HAVE TO EARN THEIR OWN LIVING AND WHO EXPECT TO PURSUE A COMMERCIAL LIFE

INTRODUCTORY TO PART ONE.

My object in republishing and revising this part is twofold: First. The subject of education, in itself, is of the highest importance, and one on which I maintain the public at large holds anything but sound and sensible views. Second. Every boy and young man has a right to know the facts — to know exactly what higher education is prepared to give in exchange for his time and money.

In the term "higher education" I include everything beyond the grammar grades of the public schools.

In investigating the so-called higher educational institutions — including always the high schools — one is impressed by their enormous growth within the last half-century.

Fifty years ago comparatively few high schools, colleges and universities were in existence in the United States. To-day, as shown by the reports of the Commissioner of Education, at Washington, there are some 577 universities and colleges. The value of the property held by these institutions aggregates about $554,000,000, and they have enrolled in the neighborhood of 250,000 students. In the 9,560 secondary schools there are nearly 1,000,000 pupils.

As the secondary schools and colleges between them demand eight years of a youth's life — and

eight of his best years at that — to say nothing of the money cost of his tuition and the money he might earn during those eight years, estimated at about $10,000 in all — surely it is proper to ask what this higher education has to give the boy, and whether this educational equipment is going to make him more fit for earning his living than is the lad who goes directly into his life's work from the common grammar schools.

The value of education largely is a matter of individual opinion. But its real value may be approximated somewhat by getting the preponderance of opinion, as to its utility, from unbiased men who are in the best position to judge. This course I have followed throughout my inquiries, as I have felt that individual opinions, no matter from how high authority they come, would have but little weight in the settlement of this question.

Another reasonable way of judging of the importance of higher education is to go back to a time when we had little of it and see if humanity is any better off to-day — materially, intellectually and morally — than it was then.

I think it is safe to say here that this country has made the most wonderful progress in its history, in all general lines conducive to prosperity and happiness, during the last fifty years. And it is equally safe to say that higher education had little or nothing to do with this condition, for practically none of the men to be credited with this advancement had more than a grammar-school education.

This being true, the question naturally arises: Is it advisable to rush into such extensive and expensive experiments in higher education when such marked

progress has been made without it, and when the great employers of the country, almost to a man, show no disposition to give preference to the products of higher education?

Isn't it the part of wisdom and prudence to look around and study the results of all this higher education? Shouldn't it be perfectly clear that in seeking an education you are getting what you pay for? No one would buy millions of dollars' worth of merchandise without knowing its actual value.

It is the purpose of this book to give the results of such a study, to expose the falsity and extravagance of the claims made by the higher educational institutions, to set young men to thinking clearly for themselves, and to mold public opinion to the point of demanding that the high schools, colleges and universities shall show clearly not only that they are doing good, but are doing it in proportion to their cost.

My criticism of higher education (first published in 1902, and here reprinted slightly revised as Part One) stands more solidly than when it was first written. It has not been, and can not be, assailed successfully.

The soundness of the work has been endorsed on every side, and my position has been strengthened further by the general popular denunciation of colleges, and the widespread, sharp criticism of our high-school system, that have grown so common of late.

In this book, while I criticize education, it should be borne in mind that I make a great distinction between the terms education and schooling. Schooling is simply learning or memorizing a lot of unimportant things, while by education I mean knowing important things.

I realize that in discussing this question I am at a decided disadvantage for several reasons:

First. In questioning the utility of college work in any department, the natural inference is that I must favor ignorance.

Second. Popular sentiment is in favor of colleges, because a great many people, if they do not favor colleges on account of the benefit of the schooling to the student, favor them as being highly ornamental.

But before I finish this question, I think my readers will see that I am quite as much in favor of education as most people are, and a great deal more than some who pretend to favor it.

The difference between us is that I am in favor of the education that educates and consequently makes men valuable citizens, rather than the class of men that these institutions generally turn out.

It may seem to some that, in commenting on the letters received in response to my inquiries, I am too severe at times; but I think the candid reader will agree with me that in the main, at least, my opinions have not been expressed too strongly.

I asked simple, straightforward questions. I expected direct, straightforward answers. Yet, in nearly all of the letters from college men, and in not a few of those from business men, the answers are vague and unsatisfying, and in some instances actually evasive.

It has seemed to me that in some of the letters there is much "hedging," as though the writers did not wish to speak out honestly and clearly, for fear of offending their college friends. When such letters come from business men I feel that I am justified in criticizing

them sharply, because they do not impress me as being frank. It looks as though this were one influence of the colleges that no amount of friendliness toward them should be able to commend.

CHAPTER I.

HERBERT SPENCER'S OPINION OF A CLASSICAL EDUCATION.

Upon the subject of education, Mr. Herbert Spencer has the following to say:

> The remark is trite that in his shop, or in his office, in managing his estate or his family, in playing his part as director of a bank or a railway, he [the college graduate] is little aided by this knowledge he took so many years to acquire — so little that generally the greater part of it drops out of his memory. * * *
>
> If we inquire what is the real motive for giving boys a classical education, we find it to be simply conformity to public opinion. Men dress their children's minds as they do their bodies, in the prevailing fashion. * * *
>
> A boy's drilling in Latin and Greek is insisted on, not because of their intrinsic value, but that he may not be disgraced by being found ignorant of them — that he may have the "education of a gentleman" — the badge marking a certain social position, and bringing a consequent respect. * * *
>
> To get above some and be reverenced by them, and to propitiate those who are above us, is the universal struggle in which the chief energies of life are expended. * * *
>
> Not what knowledge is of most real worth, is the consideration, but what will bring most applause, honor, respect — what will most conduce to social position and influence — what will be most imposing. As throughout life, not what we are but what we shall be thought, is the question; so in education the question is not the intrinsic value of knowledge so much as its extrinsic effects on

> others. And this being our dominant idea, direct utility is scarcely more regarded than by the barbarian when filing his teeth and staining his nails. * * *
>
> But we that have but span-long lives must ever bear in mind our limited time for acquisition. And remembering how narrowly this time is limited, not only by the shortness of life but also still more by the business of life, we ought to be especially solicitous to employ what time we have to the greatest advantage. Before devoting years to some subject which fashion or fancy suggests, it is surely wise to weigh with great care the worth of the results, as compared with the worth of various alternative results which the same years might bring if otherwise applied.

Doctor Eliot's "Five-foot Shelf of Books."

To the foregoing I would add the following significant statement made recently by Dr. Charles W. Eliot, for forty years president, and now president emeritus, of Harvard University.

After selecting from the best literature of the world a number of books that can be placed on a five-foot book shelf, Doctor Eliot says:

> It is my belief that the faithful and considerate reading of these books, with such rereadings and memorizings as individual taste may prescribe, will give any man the essentials of a liberal education, even if he can devote to them but fifteen minutes a day.

This deliberate expression by a man who has spent his life in higher educational work coincides exactly with my own belief as expressed in several of my papers on education, and that is: Young men who wish to become enlightened or educated on any particular subject may obtain from books all the knowledge required, provided they can find what books to read. Such persons do not need to be urged to read

and study for themselves; neither do they need to go to a teacher, for the teacher can tell them nothing more than they can find for themselves in the books.

There is nothing specially remarkable in President Eliot's statement — except it be that he goes further than I have done in saying that not only may an education on special subjects be obtained from books, but also all the essentials of a "liberal education."

Doubtless Doctor Eliot always has known this, as most reasonable persons have, but he has kept the knowledge to himself until now that he is practically through with active college work he thinks that he might as well be honest about the matter and give the public the benefit of his mature judgment.

All educators must know this fact as well as Doctor Eliot, yet they go right along encouraging young men to spend their time and money going to college, when they might be earning their living, developing their character without the risks incident to college life, and getting the essentials of a liberal as well as a practical education from the best books of the world.

CHAPTER II.

OPINIONS OF COLLEGE MEN.

It should be borne in mind that wherever college education is mentioned in Part One it refers exclusively to the so-called "academic" course, or the classical and literary department. Too much emphasis can not be laid upon this distinction, for neglect of it is the cause of a large part of the confusion of thought and expression on this subject which is so prevalent among even the educated. By referring to the letter of Charles W. Eliot, on page 26, it appears that even so highly educated a gentleman as the former president of Harvard University confounds an academic course with scientific and technical courses. The reader is urged to avoid this mistake.

The question whether an academic, or even a high-school course is of benefit to young men who have to make their own way in the business world and intend entering upon a commercial life, is one of such vital importance and is surrounded by so much doubt, that it is high time it was thoroughly investigated. If the facts are as many believe, these institutions are the cause of most serious error, if not of positive injury to this class of young men.

A great deal has been written upon this subject, but, as far as I have been able to discover, the writers have given merely their opinions or theories, not facts. The great majority of college presidents agree in urg-

ing the importance of college education for business men, as will be seen by reference to the letters quoted in the following pages from prominent educators.

It has seemed to me that the testimony of a large number of heads of universities, college graduates, and prominent business men would be of great assistance in arriving at something tangible on this subject. I have, therefore, made an extensive investigation along this line, the results of which are here given, together with certain comments. First will be found a copy of a letter sent to the presidents of nineteen of the principal universities and colleges in this country, and the replies from all who answered; which will show how little light they are able to give on this subject.

A Copy of the Letter Sent to College Presidents.

Chicago, September 5, 1901.

Dear Sir:

The question of the utility of an academic course for young men who have to make their own living and who expect to pursue a commercial life, is one of the greatest importance, and as I am endeavoring to ascertain what the facts are in this matter, I should be very glad indeed if you would kindly favor me with an answer to the enclosed questions.

Thanking you in advance for your attention to this matter, I am

Yours truly,

R. T. Crane.

The Questions Asked.

1. Is there, in your opinion, any evidence that such education is of any advantage to this class of young men?

2. If so, what evidence?
3. Have you made any systematic effort to ascertain:
   [*a*] What success such college graduates have met with in securing positions?
   [*b*] How successful they have been after going into business?
4. If question No. 3 is answered affirmatively, what have you found to be the facts?
5. Can you mention any employers who, when seeking employees, are in the habit of asking, from the head of any college, information regarding students about to graduate, with the view of selecting their help from among such students?
6. Please give an estimate of how much it costs your college to give a young man such a course of education. I do not mean by this simply the student's tuition, but you should also include interest on the plant, taxes, insurance, wear and tear, in fact everything that enters into the actual cost of running the college.
7. Can you give me the names and addresses of the secretaries of classes that were graduated from your college five to eight years ago? I may wish to obtain from them a list of their classmates, in order to make some inquiries of such young men, should the information received from the heads of the colleges be unsatisfactory.

The Opinions of College Presidents.

Six of the universities did not reply, *viz.:*

Cornell University.
Washington University, St. Louis.
University of Pennsylvania.
University of Wisconsin.
University of Minnesota.
University of Rochester.

The replies received from the others I give complete, with the exception of their answers to questions

Nos. 6 and 7. The reason for omitting No. 6 will be found on page 99, Question No. 7, of course, is of no interest to the reader.

In considering individual letters, I shall comment only on such ideas as are peculiar to one letter. The ideas the various writers have in common will be treated under a general head.

CHARLES W. ELIOT,

President of Harvard University.

The question of the utility of an academic course for young men who are going into business can not be intelligently discussed unless the term "academic course" be clearly defined. I understand it to comprehend any course of study in a college or scientific school which covers approximately the years from seventeen or eighteen to twenty or twenty-two. With this understanding of the term, there can be no question whatever that an academic course is in the highest degree desirable for capable young men who mean to make their living in business. By business I understand banking, transportation, manufacturing, mining, large-scale farming, and engineering in all its branches. These occupations require nowadays, in all their higher levels, a trained mind, and a deal of appropriate information. This training and information can only be acquired in colleges and scientific schools. *A young man who is going into business had better take an academic course, in my sense of the term, if he has any mind to train.* That is an indisputable proposition, and there is no use in discussing it.

To get detailed evidence of the truth of these statements, I should advise you to procure a series of the triennial or quinquennial class reports, which are published by the class secretaries at Harvard, and I suppose at other colleges. These reports give the occupations and mode of life of the members of a class, and even of persons who have been temporarily connected with the class.

> By a careful examination of a series of these reports you will get abundant evidence that college and scientific school training nowadays is profitable, indeed, indispensable, to a young man going into the higher walks of business. To procure such a series from Harvard you had better apply to Mr. Jerome D. Greene, President's Secretary, Cambridge, Massachusetts.

This letter, from so high an authority, is such a perfect illustration of the weakness of the whole argument on the affirmative side of my subject, and of the prevalent confusion of thought concerning it, that I give it special notice.

Doctor Eliot's broad assertion that there is no use in debating the question, that it is best for a young man to take an academic course, no matter what business he is going into, is right in line with all the absurd positions these people take. That is, his idea is that we must accept his statement regardless of any evidence.

In order to make out his case, Doctor Eliot is obliged to stretch the academic course to cover every department, classical, scientific or technical; and then, with equal generosity, he tries to make "business" include farming, mining and engineering. Of course, all that has nothing to do with the case.

The stretching of the academic course to include every department in a college or a scientific school, and also his broad definition of business, is absurd; and there is no possible excuse for his not understanding my question and giving me a frank and honest answer.

I think it only fair to say that he found himself, like all college men, unable to make a good showing, and that he stretched the question for the sake of making a better case.

It is only too evident that the distinguished gentleman has neither given the subject adequate thought, nor has he sufficient data on which to base an opinion. The reports to which he refers, giving "occupations and mode of life" of graduates, would necessarily be valueless in determining the question whether a classical and literary education has assisted them to commercial success.

In regard to his saying that we can procure information as to this feature from the class reports, I have gone all through that sort of thing, and the information obtained — as may be seen easily in this investigation — has been most unsatisfactory. It strikes me as being exceedingly strange that a man in such a position as Doctor Eliot does not show sufficient interest in his work to investigate the lives of his former scholars and outcome of their education, so as to know definitely the value of the schooling he has given. Then, in presenting his institution to the public, he could give definite information as to its value, instead of asking people to take it on faith.

ARTHUR T. HADLEY,

President of Yale University.

We regard college education as of great advantage to the business man, as well as the professional man. This is not, however, because it enables him to make more money, but to have more influence and enjoyment with the same amount of money. It is this broader general object which distinguishes the college course from the purely technological one.

The evidence is found in the actual position held by our graduates in the various cities in which they live. One of my most important objects in meeting the alumni associations throughout the country was to obtain a thor-

ough basis of judgment on this point. It is obvious, however, that the facts concerning this kind of success are not readily capable of tabulation.

No systematic effort has been made to compare the success of our graduates in securing positions with the success of any similar body of men who had not been to college.

We prefer not to publish a list of employers who are in the habit of consulting us.

Regretting the absence of more detailed information, I remain, etc.

President Hadley, like a number of others, speaks of education as tending largely to the producing of happiness. I think it would be pretty hard to prove this assertion, for education without a considerable supply of money has a tendency to lead to discontent rather than to happiness.

But, even if it be true that education leads to happiness, why not distribute that happiness more equally by giving more education to the poorer classes of society, instead of by adding more to those who already have more than their share?

The weakest point in President Hadley's letter is that he can not possibly get a clear idea of the value of college education to his graduates simply by meeting them at alumni meetings.

If that is the main stress he puts on the value of "higher education," it seems to me it is due to the public that he should present some definite information on this subject.

FRANCIS L. PATTON,
President of Princeton University.

In reply to your letter of September 5, I can only say that I believe that those who can afford to obtain a uni-

versity education should do so, no matter what their career is to be. I believe that those who intend to enter commercial life will not regret the years they may have spent in obtaining college education. But I can not answer the specific questions which you present to me, and I have no specific data to give you in reference to the subject.

NICHOLAS MURRAY BUTLER,

President of Columbia University.

I find myself unable to answer the questions contained in your circular letter of September 5 in detail, but may say that we have here abundant evidence that students who make good use of their opportunities, while undergraduates in college, are eagerly sought for in business positions. The man who does not make good use of his opportunities in college is in the same position as one who has neglected his opportunities elsewhere.

Mr. Butler was asked to furnish the evidence that his "students who make good use of their opportunities are eagerly sought for," and he failed to do so.

G. STANLEY HALL,

President of Clark University.

I have too little detailed knowledge to answer your questions, and have made no systematic effort to ascertain such as your third question calls for. In general, my opinion is that the utility of an academic career for business purposes depends largely upon what kind of an academic course is taken. On such a scale I fancy the old classical course would mark very low, and some of the modern technical and commercial courses and many of those in the sciences would mark very high. In these days of the elective system, an "academic course" has so wide a range of meaning as to be too indefinite to make results of much value, unless they are taken account of.

President Hall falls into the same error as Doctor Eliot in stretching "academic" to include technical and commercial courses.

JAMES B. ANGELL,

President of the University of Michigan.

In answer to your inquiry about the utility of an academic course for young men who expect to pursue a commercial life, I beg leave to say that we have never undertaken to gather any statistics on this point. We know that a good many of our graduates are successful business men. Our general belief about the matter is simply this: that the more a man's intellectual powers are developed, the more capacity he has for any undertaking in life which calls for such powers. In other words, the more of a man one is, the more successful will he be in any worthy enterprise. I have heard business men say that, although it seemed that the time spent in college compelled the graduate to start lower down the scale at the age say of twenty-one, than a young man who had entered as a clerk say at sixteen, yet that the former often showed so much capacity for comprehending new conditions and responsibilities that in the course of a few years he passed the other. I suppose this would not always be true. Much depends upon the personality in either case.

A. S. DRAPER,

President of the University of Illinois.

I am in receipt of your favor of September 5. The subject to which your questions refer is one which, it seems to me, can not be adequately treated in the way you have adopted. I have no doubt that college training is of substantial value to men engaged in business life. I think the proofs of it are to be found without difficulty, and there are numerous evidences of it coming in one way and another to the officers of this university. At the same time these proofs and evidences can not be presented

in form in answer to categorical questions, and, moreover, it would take some time and investigation to bring them together for presentation in any form. I should be very glad indeed to attempt the task when leisure would permit, if there seems to be any general demand for it, but under the circumstances in which I find myself at present I can not attempt it.

Regretting that I am unable to render you a more substantial service just now, I am, etc.

In my opinion, Mr. Draper could not spend his time in any better way than in trying to find out the value of his work.

WILLIAM R. HARPER,

President of the University of Chicago.

Your letter of September 5 was duly received, and I beg to submit answers to the questions of your accompanying circular:

1. My opinion is that a college education is of decided advantage to young men who propose to enter business. This opinion finds a reflection in the College of Commerce and Administration, which the University of Chicago has established, a circular of which I send you under separate cover. My opinion is founded upon the theory that a trained mind anywhere is able to do better work than an untrained mind, and while, under certain circumstances, one who is working his way upward in a business from the lower positions may have a practical knowledge not at first possessed by the college graduate, yet, in the long run, at times when critical judgment and prompt decision are required, the one who has the broader outlook in an educational way ought to prove the more valuable.

2. The evidence in support of this opinion can not, perhaps, be presented specifically, but again and again students have come to the university to get additional training just because they have found that it was possible, in practical experience, for them to advance only so far.

A number of cases occur to me in which very able men have given up business positions which paid them well, because of the observation that those who had better educations were advancing more rapidly and were able to command better salaries.

3. No systematic effort has been made by the university to ascertain what success college graduates have met with in securing positions, or how successfully they have filled them after getting into business, but from my knowledge of the alumni of the University of Chicago, and of other institutions with which I have been connected, my opinion is that while at the start there has been some disappointment in the realization of ambitions, yet in the main, college graduates who have entered business have been as successful as could be expected.

4. N. W. Harris & Co., of this city, have made inquiry at the University of Chicago for the names of any students about to graduate who desire to enter business, and we have been able to refer to them a number of excellent men who were accepted by them on our recommendation, and who now are either employed by them or have been advanced to better positions because of the excellence of work done with them.

Swift & Co., of this city, have employed a large number of graduates of the University of Chicago, and students not graduates, who have been recommended to them by the university authorities. Letters of inquiry of a similar nature are received frequently from other business houses, these two mentioned being perhaps notable.

President Harper also misconstrues my question of an academic education when he refers me to the College of Commerce and Administration.

BENJAMIN I. WHEELER,

President of the University of California.

It is difficult to answer your letter of the 5th inst., because it is uncertain what you mean by "academic course." Within our academic course is included, for

instance, work in mining, electricity, mechanics, etc. We put these studies on the same level with the humanistic studies leading to the degree of B. A.

I think there is evidence that an education in commercial branches or in engineering is serviceable for young men about to enter a commercial life. I think there is lack of evidence on the subject of the more general course of study, with the presumption against it.

In addition to the letter above quoted, he answers in the negative to the question whether he has made any systematic effort to ascertain what success college graduates have met with in securing positions, and how successful they have been after going into business.

The answers from the next four gentlemen are quoted as given on the inquiry sheet sent to them.

GEORGE MACLEAN,

President of the University of Iowa.

In reply to the question whether, in his opinion, there is any evidence that such education is of advantage to this class of young men, he says: "Decidedly yes."

To the request for evidence upon this point, he answers: "Statistics of 'Who's Who,' articles by President Thwing, and observation in my circle of acquaintances."

He states that no systematic effort has been made to ascertain what success such college graduates have met with in securing positions, or how successful they have been after going into business.

In answer to the question whether he could name any employers who, when seeking employees, are in the habit of applying to colleges, he says: "Applications not infrequent."

EDWARD H. GRIFFIN,

Dean of the College Faculty of Johns Hopkins University.

President Ira Remsen, of the Johns Hopkins University, stated that, as he had just assumed office and had had no experience that would help him to answer the questions, he had referred the inquiry to Edward H. Griffin, Dean of the College Faculty. This gentleman replied as below.

To the question whether there is, in his opinion, any evidence that such education is of any advantage to this class of young men, he answers: "Yes," the evidence being, as he states: "The successful careers of the vast majority of college graduates."

How does he know they have been successful?

In reply to the question whether he has made any systematic effort to ascertain what success such college graduates have met with in securing positions, and how successful they have been after going into business, he says: "I have made no such effort, but have followed the subsequent lives of most of my students and have been struck with the small percentage of failures."

The question whether he can mention any employers who apply to colleges when seeking help, he answers in the negative.

E. BENJAMIN ANDREWS,

Chancellor of the University of Nebraska.

He replies "Yes" to the question whether, in his opinion, such education is of any advantage to this class of young men, and in response to the request for this evidence he says: "They get higher positions, as a rule. This is not the highest advantage.

The highest advantage is that they have an inner life of enjoyment in reading, thinking, and understanding things."

Replying to the question whether he has made any systematic effort to ascertain what success such college men have met with in securing positions, he says: "No effort is needed to one in my business; the facts are obvious."

As to how successful they have been after going into business, he replies: "In the main, highly so." He further remarks: "Take a period of twenty or thirty years after graduation, and the well educated get and keep positions far more securely and regularly than others of the same ages."

To the question whether he could mention any employers who are in the habit of applying to colleges when in need of help, he answers: "Yes, I could name a considerable number."

When I wrote to President Andrews, requesting the names of this "considerable number," he replied that he guessed he had made it a little too strong; that he could name only two, and one of them was dead!

DAVID STARR JORDAN,
President of the Leland Stanford, Jr., University.

In answer to the question whether, in his opinion, there is any evidence that such education is of any advantage to this class of young men, he says: "Such an education is of daily advantage to any man of brains and character."

When asked for evidence on this point, he replies: "It gives not always better wages, but a broader horizon, a more refined taste, a saner judgment, and a higher range of friends."

Answering the question whether he had made any systematic effort to ascertain the success such college graduates have met with in securing positions, and how successful they have been after going into business, he says: "Every one in any field finds a place as good as he is fit for, experience being also considered. I keep pretty close watch of our own graduates and know of no failures, but our graduates are too young to show many notable cases; the first class was graduated in 1895."

In reply to the question whether he can mention any employers who are in the habit of applying to colleges when in need of help, he says: "Employers desiring engineers or teachers frequently make such applications."

What the Replies Show.

President Hadley, of Yale University; President Wheeler, of the University of California, and President Hall, of Clark University, are the only ones who are frank enough to admit that the presumption is against the practical utility of an academic course for business men.

Such admissions coming from three men so prominent ought to set people thinking and questioning the utility of the college education for a business man. In view of the fact that so many of their students would go into business, the natural tendency of college presidents would be to claim that their institutions had advantages in qualifying a man for business.

All of the others appear to be positive that such education is of benefit to men in commercial life; but when asked for evidence to support this claim, few have attempted to furnish it, and such information as

these few have offered is found, upon investigation, to amount to nothing.

I leave it to the public to judge whether the heads of these institutions have a proper appreciation of the importance of making accurate statements on this subject. There is nothing in their letters to show that they have made any investigation to ascertain the true condition of the question.

It certainly would not do for a business man to conduct his affairs in this way. If he turns out valueless goods and makes false statements about them, he very soon finds that it has a disastrous effect on his business.

CHAPTER III.

OPINIONS OF COLLEGE GRADUATES

Next will be found a copy of an inquiry sent to the members of classes that had been graduated about seven years before from the following institutions:

Yale University.
Harvard University.
Cornell University.
Columbia University.
Princeton University.
University of Chicago.
University of Rochester.
University of Pennsylvania.
University of Illinois.
University of Iowa.
University of Minnesota.
University of Wisconsin.
University of Nebraska.
University of California.

A Copy of the Letter Sent to College Graduates.

The utility of an academic education for young men who have to earn their own living, and who expect to pursue a commercial life.

Dear Sir:

In connection with a paper that I am preparing upon this subject, I am desirous of obtaining from college graduates some definite information regarding the points mentioned on enclosed sheet.

Those whom I particularly wish to hear from are the graduates who entered upon a commercial career and were obliged to start out to make their own way in the world without the influence of either family or

friends — in other words, without what is commonly called a "Pull."

Not knowing the conditions that have surrounded the various members of your class in college, I am sending this letter to each of them.

Of course, if you do not come under the list above referred to, your answers to these questions are not desired, but in that event I should be very glad if you would advise me of such fact.

The subject I am investigating is one of so much interest and importance that I sincerely hope all to whom this letter applies will assist in this effort to arrive at a solution of the matter by furnishing the desired information.

Thanking you in advance for your kind attention to this request, I am

Yours truly,

R. T. CRANE.

THE QUESTIONS ASKED.

1. When did you leave college?
2. When did you first take a position after leaving college?
3. How many positions have you held?
4. Length of time in each position?
5. What was the nature of your work in the various positions?
6. Salary received in first position?
7. Present salary?
8. Was your college education of any advantage to you in obtaining a situation?
9. Has it been of benefit to you in the performance of your duties and in securing advancement?
10. What, in your opinion, would have been your position to-day, as compared with the place you now hold, had you, instead of going to college, started

at that time in a position similar to the one you did obtain after leaving college?

11. If you had your life to live over, would you take a college course in preference to starting in business that much earlier?

The Replies and Certain Deductions.

Total number of letters sent to college graduates	*1,593*
Letters returned undelivered	*129*
Answers received	*555*
Number not replying	*909*

Of the 555 answers received, 490 were from students who have either taken up a professional or technical line of work, or who state that they do not come within the scope of this investigation.

This leaves only sixty-five letters from the class of young men whom I particularly desired to reach, which is so small a proportion of the whole that the information furnished by them does not throw much light upon the subject. I will, however, tabulate their replies, so that the public may see what they have to say.

In regard to the question concerning their present income, fourteen do not answer at all and twenty state that they are in business for themselves. The replies from the remaining thirty-one show that nearly all are doing very well on this score.

The question whether a college education has been of benefit to them, in the performance of their duties and in securing advancement, is answered in the affirmative by fifty, and in the negative by seven. The others give no information upon this point.

To the question whether their college education was of any advantage to them in obtaining a situation,

thirty-two answer "Yes," and twenty-seven "No." The remainder either state that they do not know or make no reply whatever.

When we consider the general spirit of loyalty toward the colleges which the students have exhibited in their letters, the fact that nearly one-half of the answers to this question are in the negative would seem to be sufficient evidence to settle this matter to the satisfaction of every one.

In answer to the question — what, in their opinion, would have been their position to-day, as compared with the place they now hold, had they, instead of going to college, started at that time in a position similar to the one they did obtain after leaving college — twenty-seven believe it would have been inferior, fourteen that it would have been better, and thirteen that it would have been about the same.

Loyalty to the College.

Sixty out of the sixty-five say that, if they had their lives to live over, they would take a college course; for even those who admit that they would be better off financially if they had not gone to college, claim that whatever they lose in this respect is more than compensated for by the college experience and the increased capacity which it has given them for enjoying life. An extreme instance of this is seen in the case of one of these young men who states that upon leaving college he had neither pull nor capital; that he thinks his college experience was of no material or direct benefit to him in securing a position; that he finally drifted into the cattle business out West, in which he was unsuccessful, and that he is now out of a position.

Notwithstanding all this, and admitting, as he does, that had he continued in business instead of going to college, his financial condition undoubtedly would have been better than it is to-day, he says:

> I think I am safe in saying that if I had the decision to make over again I should again take the college education. It may not make great returns on the investment in actual money, but to the man who has the taste and determination it makes, I feel, adequate returns in the enlarged field he is given for the pursuits of his life with happiness to himself, and with some benefit to those about him.

In further illustration of this feeling, I refer to a letter from a young man who has gone into the banking business, and whose statements are quoted elsewhere in connection with another branch of the subject. While he frankly acknowledges that his college education does not compensate for the lack of practical training, and that, so far as his business is concerned, he would be better off if he had remained at home, still he says that, if he had his life to live over again, he would certainly go to college, "Since the satisfaction of a broader life makes up for financial loss."

Value of the Evidence.

Inasmuch as it is highly probable that the replies received represent that part of the 1,593 men addressed who are able to make the most favorable report, it may be fairly assumed that the sixty-five letters which are pertinent to our inquiry constitute the best showing which can be made on the affirmative side. From this point of view they can hardly be regarded as very strong evidence of the college graduate's success in business.

But this evidence, such as it is, becomes still weaker in view of the nature of the replies made to the last question. It is evident that sixty out of the sixty-five believe that the intellectual advantages coming to them from college education are more valuable than financial success, and this bias has doubtless influenced their judgment in replying to questions 8, 9 and 10. For it is to be noticed that, in the answers to 8, 9 and 10, we have no particulars or facts, but only the vague general judgment of the writers.

Much more to the point are the positive statements by several that they really found a strong feeling among business men against employing college graduates, and that they were actually at a disadvantage on that account.

Prejudice Against College Graduates.

As one of them remarks:

> The man who has been trained to do certain work, says: "Will you hire me? I can do this work." College graduates can only ask for a chance to try to do it. * * * Judging from my own experience, a graduate of a college who should try to make his way in the world in commercial life, absolutely without influence of family or friends, would stand a poor chance in competition with the young man of equal age who had received a thorough business training.

Another, who, upon leaving college, took up newspaper work, and is now proprietor of a paper, says:

> I belong most decidedly to the class you mention. In entering upon my business life, after completing my course, I found a strong feeling against the "College Graduate." I was actually at a disadvantage due to this prejudice. I have always guarded against any reference

to my college work when in business circles, feeling that it was the discretion that is "the better part of valor." Of course, I am persuaded the drill at college has enabled me to make progress and enjoy to-day a broader life than would have been possible without it.

Conflicting Opinions of Two Graduates.

As an example of the conflicting opinions held by men in the same line of business, with regard to the benefits of a college education in a commercial life, I quote from letters received from two students who are now engaged in banking.

The first, upon leaving college, became connected with a bank which his father (who received only a common-school education) had already built up into a successful concern. This young man says:

Whatever success I may have received I attribute entirely to my course at college, where I learned to judge human nature in a way I could never have acquired elsewhere; also, the methods used to learn the college lessons I have been able to apply to other things and arrive at a rapid and accurate conclusion. I was also taught self-reliance, and to stick to a thing until it was accomplished.

His opinion of what his position would be to-day, had he started in business at the time he entered college, is expressed as follows:

I would have been an undeveloped, narrow-minded bank clerk, and would never have achieved any of the success I may have done. College taught me to judge human nature, the most important thing in banking.

This letter might seem, on superficial consideration, to constitute strong evidence for the affirmative, but most of its strength evaporates after more careful perusal. What the writer has to say about being an

"undeveloped, narrow-minded bank clerk" if he had not gone to college, shows plainly that he, also, is confounding intellectual advantages with financial success. Our investigation has to do with the latter only.

The rest of what he says is more to the point, but the question whether college is a better place for learning self-reliance and knowledge of human nature than the business world, is considered fully on page 108.

The other banker says: "I unfortunately work in my father's bank, holding a position my education did not especially fit me for. Had I foreseen a business career, I am certain the college education I received could have been combined with other work that would have been of immense advantage to me. A literary and scientific education does not compensate me for the lack of practical knowledge."

In regard to the question whether a college education has been a benefit to him in the performance of his duties, etc., he says: "No and yes — my general information has helped me, but my lack of special and local knowledge has hurt."

With regard to his probable position had he not gone to college, he says:

> In a country bank thorough knowledge of local conditions and acquaintance with people, with proper clerical experience, is everything. I would be better off in this respect if I had stayed at home.

Failure to Reply.

I particularly requested in my letter to college men that all to whom this inquiry did not apply take the trouble so to inform me, for which purpose a return envelope, stamped and addressed, was enclosed. As

so many who did reply seem to have been prompted by a spirit of fraternal feeling and of loyalty toward colleges to go out of their way in order to say a good word for these institutions, I think it is proper to infer that the large number who refrained from answering had been unsuccessful in business and feared that an acknowledgment of this fact would be used to the disadvantage of colleges. Owing to their feeling of loyalty, they would not like to see this done.

Second Letter of Inquiry.

After the publication of the first edition of this book, Mr. A. C. Bartlett, in a letter to the Chicago *Tribune,* of February 4, 1902, took exception to the foregoing remarks regarding the young men who failed to answer my original inquiry, claiming that " in these days of printed circular letters upon all manner of subjects, the failure of a thousand to respond should hardly be attributed to a want of success." In order to find out, if possible, something about those graduates, I then sent out letters of inquiry regarding them to people living in their vicinity.

This later investigation brought in only 353 replies that contained any information, and as in most cases the answers were incomplete and unsatisfactory, it is of little value in the consideration of this subject. There is nothing in it to cause me to change the opinion expressed above regarding these young men.

CHAPTER IV.

OPINIONS OF BUSINESS MEN.

The preceding pages have given the reader the best arguments that can be produced in favor of a classical and literary education for business men, by the most prominent advocates thereof. But these need to be supplemented by the opinions of employers and practical business men.

The judgments of college presidents and college graduates on such a subject are of necessity altogether theoretical, even when they are not biased. In all probability, no college president ever has been obliged to go into the open labor market, as a graduate, and compete with hundreds of others for a strictly business position; nor has he been an employer in strictly commercial lines. No man can be fully competent to understand, or to give reliable advice upon, the subject before us who never has had actual business experience either as employer or employee.

It is the hard-fisted business men against whom the college graduate has to run if he wishes to succeed in the commercial world, and I regard them as the only men to whom you can look for any tangible and satisfactory information on the subject. If the subject interests you, I should advise you to read and weigh carefully what these men have to say. I think that in striving to settle this question you will find a great many stumbling-blocks in the form of false and misleading statements from various classes of people.

Even the replies of business men, as shown in the following pages, are often so indefinite as to be of no value for my purpose. No dependence can be placed upon any of them who fail to make their practice consistent with their theories. The student who should be influenced by their letters to go to college in the expectation that he would be graduated into a good business position, would find out too late that he had been woefully deceived by some of them.

Copy of Letter Sent Out to One Hundred Business Men.

The utility of an academic education for young men who have to earn their own living and who expect to pursue a commercial life.

Dear Sir:

I am preparing a paper on the above subject, and as I am desirous of ascertaining what the facts actually show with regard to the value of such education to young men who take up a commercial life, I am sending this letter to a number of the leading and representative men in various lines of business.

Please bear in mind that this inquiry has reference to whether or not this education is a help to the success of such young men from a Commercial Standpoint only.

This subject, which is one of the greatest importance, has been theorized upon too long. I am now endeavoring, in what I believe to be a straightforward, businesslike way, to get at its real status, and I feel it is due to the young men of this country who contemplate taking a college course that those who have practical

ideas about the matter should assist in its solution by answering these questions with great care.

If any have theories regarding it that they are not acting upon in their own business, there is no objection to their stating them at the close of their letter, but what I am particularly desirous of obtaining is a reply to my questions.

The persons I am aiming to reach are those who employ the help and have made a study of the subject, and should this letter get into the hands of others, I would request that they refer it to the one in their establishment best qualified to furnish the desired information.

It must be borne in mind that this inquiry does not have reference to the effect of education upon particularly bright boys, but simply the general run of them. Neither is consideration to be given to any regret which some especially successful men may feel because of not having received more education. These matters do not come within the range of this investigation.

Thanking you in advance for your attention to this request, I am Yours truly,

R. T. CRANE.

THE QUESTIONS ASKED.

1. Have you any college men among your employees?
2. If so, what proportion are they of your entire force of the same class, or of all classes of help in which such persons would likely be utilized?
3. [*a*] In selecting help, do you give preference to college men?
   [*b*] Or do you avoid them?
4. If you favor such men, is it your experience that they make better help than persons of about the same caliber who have no college education—

that is, on account of having received such education?

[*a*] Do they show greater mental ability?

[*b*] Do they advance more rapidly?

[*c*] Are they generally of better character?

5. [*a*] If you believe that the mental training which a young man receives in college tends to improve him and make him more valuable to you in your business, have you made a practice, when seeking employees, of applying to the heads of colleges for information concerning students about to graduate, and selecting help from those whom they might recommend?

[*b*] If not, why?

(6th, 7th and 8th stricken out.)

9. Do you consider that there is need of more than a grammar-school education in a general business life?

10. Will not the work and experience that a young man obtains in any line of business develop the mental qualities required in that business fully as much as would a course in college?

11. Estimating that it costs in the neighborborhood of $5,000 to go through college, would you advise a young man who had only this amount of money, to spend it for a college education?

12. If you favor those who have had a college education, then take the case of two young men of equal age and mental caliber, one of whom (having had simply a grammar-school education) starts in business and the other goes to college. At the time the latter leaves college (assuming that the other were then worth $1,200 a year to you), if it were possible to make a twenty-year contract with each of these young men for his services, how much more would you be willing to pay the college man for the twenty years?

(It should be remembered that the first young man has had about eight years' experience in the business at the time the latter leaves college.)

13. Can you give me the names of any business men who are large employers of this class of help, and whose opinion upon this subject would be valuable?

Some of the replies from business men were short and clear-cut, and these are given in full. But in others the writers introduced so many conditions and complications that to quote their letters in full would be most confusing, and in order to avoid this I have given simply a brief synopsis of their answers.

The Replies and Certain Deductions.

MR. M. B. WALLACE,

Secretary of Samuel Cupples Wooden Ware Company, St. Louis, Mo.

Instead of quoting Mr. Wallace's answers to the various questions, I give a copy of the letter received from him, as this seems to express his views more clearly:

Your circular letter of September 5 has been received, and I take pleasure in answering your inquiries on the subject of education of young men, and in further explaining my views on this subject will say that the greatest difficulty I have had in employing college men has been that, while they say when they want employment that they are anxious to get down at the bottom of the ladder and work their way up, still if they do not find themselves advanced more rapidly than is consistent with either good business or fairness to the other employees, who are in all probability just as capable as they are, they become dissatisfied, and do not think they are getting along fast enough.

The mistake most of them make is that they have an idea they are smarter and are above the average class of employees, which immediately places them at a disadvantage, as the feeling, of course, is promptly resented by the other employees, and, in whatever way they can, they make it harder for the college man to get along.

As a general proposition, I would prefer not to have a college man, unless I was satisfied that it was necessary for him to work and that he would not become dissatisfied too soon and want to change because he was not getting along fast enough.

Your twelfth inquiry is one that is, to my mind, very hard to answer, and I do not believe that I or anybody else could even make a fair guess at which would be the more valuable man of the two at the end of twenty years. My impression, however, is that, if the young man was doing his work in a thoroughly satisfactory manner, I would prefer him rather than to take the risk on the latter.

In summing up the whole situation, the college man, to my mind, is only a desirable employee when he is, as a few college men are, conscientious, hard-working, and willing to get down at the bottom and stay there for a sufficient length of time to work his way up.

He gives the company's proportion of college men as about five per cent.

MR. J. J. DAU,

Vice-President of Reid, Murdoch & Company, Chicago, Ill.

Instead of answering the specific questions, Mr. Dau writes the following letter:

Referring to your recent inquiry upon the subject of university or higher education, we beg to say that, perhaps singularly enough, there has never been a college graduate at work in our forces. As far as expedient, we begin with boys at the age of sixteen and train them gradually to the field for which they show most efficiency. When employing a person later in life, it is naturally for

certain duties in which he must have acquired training and experience elsewhere; but even then, and with all due respect, we obtain better results three times out of four from a man who has gained his knowledge in our own house. For a young man of more than average ability, we are in favor of the best education and plenty of it, but as you go down the scale the situation alters, and sometimes, as the saying is, "a good shoemaker is spoiled to make a poor preacher."

Mr. Dau has the correct idea. Starting with the boy and making your own help is the only sensible way of running a business.

MR. F. H. PEABODY,

Of Kidder, Peabody & Company, Boston.

The chance of getting himself successfully established in business, seems to me better for a young man who goes into a business establishment on graduating from school, say at the age of seventeen or eighteen, than that of a man who spends the four years from seventeen to twenty-one in college, and the chances of being efficient up to a certain point seem to me better than those of the college student. Coming to the higher grade of work, the chances seem to me about equal.

Probably the management of our railroads illustrate as high a grade as any of business and executive ability, and the greatest managers of railroads in this country are men who, I believe, never had any college education. Edgar Thomson, President Roberts, Cornelius Vanderbilt, James F. Joy, C. P. Huntington, Mr. Plant and James J. Hill are instances, and Mr. Schwab, of the Steel Trust, I believe to be another in a different line.

But, if a man has the qualities which carry him up to the top in business, the college education seems to me likely to give him a line of valuable acquaintances, more tact in dealing with his fellow men, and more capacity for enjoying the intellectual part of life, than if he had grown up without it.

MR. EDWARD TOWNSEND,

Cashier Importers' & Traders' National Bank, New York.

I quote from his letter as follows:

> Of our entire force of over one hundred clerks we think we have but two college graduates, and they passed through one of the smaller colleges many years ago, and finished the course at a very early age.
>
> Our method, when we need to increase our force, has been for many years to take in boys just from school, of about sixteen years of age, without any previous business experience, and train them in our own methods, promoting them from time to time as the opportunity presents itself. This plan has worked very satisfactorily with us. We have found that the best material for our purpose has come from the middle-class young men who have to work to make a living. Other things being equal, we, of course, in selecting young men, take into consideration the education they have received, but at the age they enter our employ they are usually too young to have completed a college course.

MR. JAMES B. FORGAN,

President of the First National Bank, Chicago.

Mr. Forgan takes the ground that: "More depends on the man than his early education. A man's schooling is, after all, the smallest part of his education," and it seems to be his rule to look to the man rather than to his education.

He has taken considerable pains to ascertain the proportion of college men in his bank, and finds that it is from three and one-half to five and one-half per cent.

He says that they do not give preference to nor do they avoid college men; that they do not find that such men show greater mental ability or advance more

rapidly than persons of about the same caliber who have not received a college education.

While his answer to the question, "Will not the work and experience a young man obtains in any line of business develop the mental qualities required in that business fully as much as would a course in college?" is in the affirmative, and while he also says that he would not advise a young man who had only $5,000 to spend it for a college education, if he intended to enter upon a business career, he still thinks that there is need of more than a grammar-school education in a general business life.

MR. ROSWELL MILLER,

Chairman of the Board of the Chicago, Milwaukee & St. Paul Railway Company, New York.

Mr. Miller's answers to the questions all show that he is very decidedly of the opinion that a college education is of no value to a man in a business life.

In closing he makes this remark:

"I spent one year in college, and I consider it fortunate that it was not more."

MR. W. F. MERRILL,

First Vice-President of the New York, New Haven & Hartford Railroad Company, New Haven, Conn.

Mr. Merrill kindly answered the questions and also wrote several long letters, from which I quote the following:

> It has been my experience that men with a college education make better help than men of about the same caliber who have not had that advantage, when they get

to a point where their experience warrants putting them into advanced positions, and that it does not take them so long a time to get to a point where they can be safely promoted. A college education gives a young man habits of study and application which are invaluable. He learns how to use his brains to better advantage than one who has not had that training. You might just as well say that an apprenticeship is of no value to a man who is going to follow a particular trade as to say, in the case of a man who is going to use his brains, it is not an advantage to him that he should learn how to use them logically by study. Brains are capable of development the same as muscles, and there is nothing that I know of that will develop brains any faster than systematic study. A well-trained mind thinks quicker and reaches results more speedily and more accurately. My experience is that educated men show greater mental ability for the reason that I have given above; that they can advance more rapidly, because they learn how to take advantage of the knowledge of others better, and because their education broadens their intellect. It also stimulates ambition and strengthens character. I can not see why the broadening of a man's mind, even along general lines, should not help a person in a business career just as much as a professional one. The training and study of a college education simply lays the foundation upon which a young man, who afterward goes into life, has to build the superstructure, and surely a college education strengthens that foundation to a very great degree. Of course, a railroad prefers to employ men who have taken the course laid down in the technical colleges, but an academic course is exceedingly valuable to any young man who has a desire to rise above the average level.

Mr. Merrill goes on to say that he does not think college men have been given an equal chance in large business concerns. I requested him to ascertain the number of college men he had among the station agents on one of the main divisions of his road, to which he replied that they had in the neighborhood

of nine hundred stations, and he was quite sure that none of the station agents was a college graduate.

The station agency of a good-sized town is a good place to use men of ability, and it is strange that it has not occurred to Mr. Merrill to try college graduates in such positions.

MR. LUCIUS TUTTLE,

President of the Boston & Maine Railroad Company, Boston, Mass.

Mr. Tuttle does not answer the questions in detail, but writes the following letter:

> We have college men among our employees, but I am unable to tell you what proportion they constitute of our entire force of all classes of help.
>
> In selecting help we should give preference to a college-educated man, all other things being equal, and we have no prejudice against them.
>
> As a general thing, we find college-bred men capable of reaching a higher standard in the service in shorter time than those who lack the mental training that goes with education, *provided* they are willing to take hold in a subordinate place and work as others are willing to work who have not had their advantages. They, of course, show greater mental ability and advance more rapidly; and so far as we select them they are, I think, generally of better character.

MR. GEORGE B. HARRIS,

President of the Chicago, Burlington & Quincy Railroad Company, Chicago, Ill.

Mr. Harris made a very full reply to the questions, but misunderstood the particular line of my inquiry, and got a college education mixed up with other lines

of education, so that a number of his answers do not apply.

In reply to the question whether he gives preference to college men, he says: "We select those applicants who, all things considered, appear to be the most desirable."

He is not so sure that college men show greater mental ability, but it is his impression that they are better trained and that they rise more rapidly than persons who have not attended college.

He says they have *some* college men among their employees, but that he can not give the proportion, as no tally has been kept.

In one of his letters he makes this statement:

> All things being equal, it is obvious that education is beneficial alike to employer and employee. Many men of unusually strong character and ability and little education, realizing their disadvantages, sometimes overcome them by diligence and pass well-educated but indolent men in the business race. This may mislead some people. There is no doubt, in my mind, that a good education is desirable and more necessary now than ever before.

MR. JOHN C. WELLING,

Vice-President of the Illinois Central Railroad Company, Chicago, Ill.

My inquiry was first sent to the president of this road, Mr. Stuyvesant Fish, whose answers showed that he was in favor of college graduates; but, thinking more detailed information might be obtained from Mr. Welling, a copy of the letter was sent to him, and the following is the substance of his reply.

He thinks that: "If young men are studious, the mental training received in college strengthens them";

that college men "are fitted to fill more important positions, and can frequently be promoted more rapidly than men who have not had like advantages"; and that "they are apt to be broader and stronger men and so better men."

In answer to the question whether he gives preference to college men, he says: "In some positions, yes; in most positions, no."

Notwithstanding his rather broad statement in favor of college education, he says the proportion of college men in their employ is very small, and that they do not apply to colleges when in need of help, the reason for this being: "It has never occurred to us to do so; besides, we always have numerous applications from young men fresh from college for positions of one sort or other."

He believes that there is need of more than a grammar-school education in general business life, and says that "the necessity increases as the years go by."

He thinks that, as a rule, the work and experience a young man obtains in any line of business will not develop the mental qualities required in that business as much as would a course in college.

He "would not advise the average young man" (which, of course, is the sort of person to which this investigation applies) "whose means are limited to $5,000, to spend it all in taking a regular academic course in college."

In reply to my subsequent inquiry as to the number of college men among the station agents on one of the main divisions of his road, he says that out of 199, eight took a partial course in college, and nine took a full college course.

MR. E. P. RIPLEY,

President of the Atchison, Topeka & Santa Fe Railway System, Chicago, Ill.

Mr. Ripley's replies seem to refer mainly to men having a technical education, and for that line of work he favors a college course. He does not answer any of the questions directly, and I have no means of judging whether he is consistent in this matter or not.

With regard to the proportion of college men in their employ, he says: "We have quite a number of college graduates among our 35,000 or more employees, but, of course, they constitute a very small percentage of the whole."

It seems to me that if he were consistent he would have made a special effort to give more information on this point.

In his letter he says:

> I am of the opinion that college graduates are better equipped for general work, mental caliber and habits being the same, than noncollegiates.
>
> Their mental processes are more likely to be accurate; they have generally a clearer perception of the fitness of things, and can meet the public and deal with other men upon rather a better plane than a man who has not been through college.
>
> Having thus answered your questions as put, let me hasten to say that I am by no means of the opinion that every young man should be sent to college. While, as above stated, I would ordinarily give a college graduate the preference, yet it must be remembered that the four years spent in college, if spent in practical work, may result at the end of that time in giving a *practical* knowledge of a given business, which is better for the purpose of that particular business than a college education, and that *all* young men are not students, and many do not derive much benefit from a college course.

Admitting that four years in business is better than four years in college, what about eight years, in which time a young man could learn the railroad business thoroughly?

MR. MARVIN HUGHITT,

President of the Chicago & North Western Railway Company, Chicago, Ill.

Mr. Hughitt says he can not reply with accuracy to my questions, not having the necessary information, and it is evident that this matter is one which has not interested him, nor received his attention.

I quote from his letter as follows:

> The selection of help is made with regard to the applicant's competency for the position.
>
> I may say generally, however, that it is my conviction that a young man can not get too good an education. Whether it is to the disadvantage of a young man to devote the time necessary in obtaining a collegiate education, in preference to going at once into railroad or other work, depends to a very great degree, if not wholly, upon the "make-up" of the young man. And in the consideration of the advisability of the one course or the other, this question of the kind of "timber" a young man may be becomes a most important factor, in my judgment, in reaching a conclusion, considered both with regard to his school life and to his discharge of the duties pertaining to whatever line of work he may undertake.

MR. E. C. SIMMONS,

Of the Simmons Hardware Company, St. Louis, Mo.

Mr. Simmons writes at considerable length, and when I say that he expresses himself very strongly on every phase of the question as being in favor of college education for business men, it is stating his position as exactly as if I quoted his entire letter.

I will simply say further that he states that a very small proportion of their force are college men, his reason being: "Comparatively speaking, there are but few people in St. Louis who send their sons to college, and the number applying for places is very limited."

His correspondence develops the fact that he has been of his present opinion with regard to college men for only about three years.

MR. A. C. HYMAN,

President of Hibbard, Spencer, Bartlett & Company, Chicago, Ill.

Among his answers to the questions Mr. Bartlett says:

> First, considering what we deem natural qualifications, we give college-bred men the preference.
>
> We think college discipline a benefit. While they may not show greater mental *ability,* they do show mental *training;* as a consequence they advance more rapidly.

Although his letters seem to indicate that he is very strongly of the opinion that college education is of value to young men, he apparently has not followed his theory in practice, for he says that they have few college men in their employ, the proportion being very small.

MR. F. C. SMINK,

Vice-President and General Manager of the Reading Iron Company, Reading, Pa.

Mr. Smink does not answer the questions specifically, but writes a long letter, from which I quote as follows:

> I am decidedly of the opinion that what Chauncey M. Depew (who has written and expressed his views at more or less length upon this subject) is quoted as saying is

absolutely true, to-wit: "Any young man equipped with a college education increases his chances of making a living and of a more rapid promotion in any line of business, two hundred to three hundred per cent, given that he possess the requisite amount of industry, energy and persistent application that characterize every successful business man."

We have comparatively few college-bred men employed in the many varied industries under my direction and control, and their proportion to the whole is almost infinitesimal. Yet, in all new applications I invariably give preferential hearing to those graduated from some academic or collegiate institution. In the clerical or office field I now make it a rule that none be engaged, even down to the grade of office boy, who shall not at least be possessed of a high-school education. * * *

One of the difficulties often met with in considering the applications of college graduates, even though they are poor and obliged to earn their own living, is that so many are unwilling to undergo that apprenticeship or preliminary training in acquiring the details of any service which is so necessary to fit them for higher offices. The drudgery and toil involved they seem to regard as menial, and generally want to start in on a higher rung of the ladder than their qualifications entitle them to. For this reason I think we are inclined to give preference, in our selections for advancement, to the men who rise from the ranks and who have become familiar with all the degrees and stages of manufacture, or have mastered the details of offices and counting-rooms, rather than to the men whose mental attributes, by reason of their higher education, may appear more brilliant and promising.

Whether these lofty and erroneous ideas are inculcated by present methods of training or the surrounding influences of our educational institutions I shall not attempt to say, but be that as it may, I think it has been clearly established that in all branches of finance, commerce or manufacture the value of a college education invariably asserts itself.

MR. T. J. HYMAN,

Secretary and Treasurer, Illinois Steel Company, Chicago, Ill.

Specific answers are not given by Mr. Hyman, but in his letter he takes the view that the scope of my inquiry is too narrow.

He seems to think that for ordinary lines of business or office work a grammar-school education is sufficient, but that for more advanced positions a college education is essential, and that it would pay a young man to spend the time and money necessary to acquire it.

However, for the class of men referred to in this investigation, he makes the following suggestion:

> In my own judgment, the ideal course for a young man who is dependent upon his own efforts, with the facilities that are now offered for study at home, is for him to engage in his chosen line of business and take up a course of reading or study whereby he can gain technical and practical knowledge at the same time, and at the end of the given period of years he will be worth more to his employers than after the same number of years' study in college.

MR. CYRUS H. McCORMICK,

President of the McCormick Harvesting Machine Company, Chicago, Ill.

Mr. McCormick did not answer the questions in detail, but wrote two or three brief letters, from which I quote the following:

> In general, I may say that we have many college men among our employees, but they would form only a small proportion of those engaged in similar work. In selecting

help we certainly would not avoid college men, but would rather give them the preference, believing that they would make quicker progress and show a better all-around ability than those who had not had the advantages of a college education.

With the same endowment and under the same environment and with the same opportunities, I should expect a college man to win over the man who had not had such advantages.

MR. FRANKLIN MAC VEAGH,

Of Franklin MacVeagh & Company, Chicago, Ill.

In reply to the question whether college men make better help than persons of about the same caliber who have not had a college education, he says that, " other things being equal, a college education is an advantage " — same old chestnut!

He thinks college graduates do not show greater mental ability; " only more mental discipline, supposing natural abilities the same," and that they advance more rapidly.

In reply to the question whether he considers that there is need of more than a grammar-school education in a general business life, he says: " I do not think you can get too much education in business life."

Notwithstanding the fact that the foregoing answers would indicate that he rather favors a college education, he states that the proportion of college men in their employ is " very small indeed," and that he does not give such men preference when selecting help. Therefore, his preference for college education falls flat.

MR. A. ANTISDEL,

General Manager of the American Express Company, Chicago, Ill.

The letter from Mr. Antisdel seems to state his position so clearly that I quote it instead of giving his specific answers to the questions:

> This company employs comparatively few college men, and for the reason that we employ men of a younger age who have finished their course in common or high schools, and such men who show an aptitude are promoted from time to time, and most of the important positions of this company to-day are held by men who have not had the benefit of a college education, and who have risen from the ranks. While we have but few college men in our service, I believe the employees of the American Express Company are, as a rule, of a very high standard and will compare favorably with men occupying like positions in any other class of business. When we have occasion to take into our service new men of legal age, we should, everything else being equal, give the preference to the college men, for the reason that I believe their minds are better trained, and they acquire a knowledge of the business more rapidly and more comprehensively than men who have not had a college training.
>
> As to the character and habits of college men, I do not think they are any better than the class of men employed by this company, and the principal reason why I should give preference to college men is that, as before stated, their minds are better trained, and they are able to acquire a knowledge of our business quicker and more comprehensively than men of limited education, and further, such college men have the capacity to expand and grow with the business and ultimately be qualified for occupying any position in the gift of the company.

In his answers to the questions he states that he does not make a practice of applying to colleges when

in need of help, and gives as a reason the fact that until recently he has not given the subject any particular attention.

ARMOUR & COMPANY,

Chicago, Ill.

The person replying does not answer the questions specifically, but has this to say in a general way:

> While not giving especial preference to college men, we feel that such education, when coupled with energy, adaptability in special directions, with other qualifications which always render employees desirable, has a tendency to add greatly to general efficiency. * * * In selections for positions which do not involve expert training, we do not give preference to college men, as such.

MR. D. R. KINGSLEY,

Third Vice-President New York Life Insurance Company, New York.

He says he is unable to answer the questions, but writes in a general way as follows:

> College-bred men do not enter the company's service through the same avenue and do not begin at the same age, and there is almost no way in which anything like a fair comparison can be instituted between the two.
>
> We neither discriminate in favor of or against college-bred men.
>
> Of course, among the men who enter the company's service as office boys, there are no college-bred men. In the nature of things there could not be. These men make up our greatest source of supply.
>
> We, however, engage first and last a good many college-bred men, and our experience with them, in the particular line of work they are set to do, has been entirely satisfactory.

MR. MILTON H. SMITH,

President of the Louisville & Nashville Railroad Company, Louisville.

Mr. Smith writes as follows:

I am not in a position to reply to the questions propounded, for the reason that this company fills all positions in the service by promotion of employees; only their fitness for the position in view being taken into account.

MR. H. B. LEDYARD,

President of the Michigan Central Railroad Company, Detroit, Mich.

The writer does not answer the questions. He puts special stress, however, upon the scientific course, and does not give his views regarding an academic education.

MR. A. S. WEINSHEIMER,

Secretary of The Pullman Company, Chicago.

In reply, Mr. Weinsheimer said:

While we would be glad to be of service to you in this direction, we have never gathered any data in relation to our employees of the character which you mention, and I regret, therefore, that it would not be practicable for us to furnish you any information in the line of your investigation.

MR. A. H. WIGGIN,

Vice-President of the National Park Bank, New York.

He says they have no college men in their employ.

MR. W. H. LINCOLN,

President of the Chamber of Commerce, Boston.

The writer states that he has no college men among his employees; that he prefers to take younger men.

In reply to the question, "Will not the work and experience that a young man obtains in any line of business develop the mental qualities required in that business fully as much as would a course in college?" he says: "Yes — especially experience. If a young man is ambitious, he will cultivate his mind in various ways."

MR. FRANK E. PEABODY,

Of Kidder, Peabody & Company, Boston.

Mr. Peabody says he is unable to answer the questions in detail, but writes a letter, from which we quote as follows:

> We have had quite a number of college men among our clerks; the number at present is, I think, eleven out of sixty-eight.
>
> Our general experience with them has been that they have either proved exceptionally efficient, or else, finding themselves unlikely to rise rapidly, have left us voluntarily. * * * Most of the college men at present in our force have been with us but a few years.

MR. PERCY STRAUS,

With R. H. Macy & Company, New York.

The writer states that they have very few college men among their employees, but does not give the proportion.

In reply to the question whether they give preference to college men when selecting help, he says: "We have in certain instances."

He states that he thinks college men show greater mental ability and advance more rapidly than persons of about the same caliber who have not attended college. He answers in the negative to the question, whether the work and experience that a young man receives in any line of business will develop the mental qualities required in that business as much as would a course in college. In the face of this, he says he does not consider that there is need of more than a grammar-school education in a general business life, and that he would not advise a young man who had only $5,000 to spend it for a college education.

MR. F. N. BREWER,

Manager, John Wanamaker Company, Philadelphia.

We are not able to give exact information covering our entire force, but in certain departments, including those in which retail selling of goods is done, the Counting-room, Customers' Accounts, Auditing and Mail Order, in which a total of 542 men are at present employed, twenty-six are found to have passed through a full or partial college course. The other departments, such as Delivery, Packing-rooms, etc., would naturally show a smaller proportion of college men.

The third question (A and B) does not consciously enter into the consideration of employment. No doubt the fact of a college course would lead us to expect greater intelligence and thus weigh in favor of an applicant, but this is not a question which is at all habitually considered.

As you would judge from the reply to question three, we are hardly able to reply to question four, the difference, if any, between college men and others not having been sufficiently marked in our experience to have impressed us.

MR. ANDREW B. COBB,

Of Stanton, Converse & Company, Boston.

Mr. Cobb says that they have no college men in their employ, and that they prefer high-school boys. He thinks that: "As a rule, men out of college are no better fitted for business life, if as well, as boys from school, and they have to lose the four years of business training at a time when boys absorb rules and ideas very rapidly. Boys are more susceptible to training than college men."

MR. R. M. FAIR,

Manager, Marshall Field & Company (Wholesale), Chicago, Ill.

Mr. Fair's answers to the questions all show that he is not a believer in college men.

He states that the proportion of college men in their employ is five per cent.

MR. JOHN V. FARWELL, JR.,

Treasurer of the John V. Farwell Company, Chicago, Ill.

Mr. Farwell says that: "College men are apt to make a better impression with the better class of merchants whom they have as customers, while perhaps not as good with the average country merchant."

He thinks "they show greater ability in deciding questions and in making sales and purchases, and on that account are likely to advance more rapidly."

He does not, however, appear to be very enthusiastic on the subject, for in reply to the question, whether the work and experience which a young man

obtains in any line of business will develop the mental qualities required in that business fully as much as would a course in college, he says: "As a rule it will, considering the business qualities alone."

He also states that their experience has been that the graduates of country high schools, with a year or two of experience in the retail dry goods business, make the best all-around men for them.

Replying to the question, whether he would recommend a young man with only $5,000 to spend it for a college education, he says: "On the basis of a money-making success, we do not believe we would so advise."

Their proportion of college men, he says, is about five per cent.

MR. W. C. THORNE,

General Manager of Montgomery Ward & Company, Chicago.

Mr. Thorne says that the proportion of college men in their employ is about ten per cent; that persons having a college education show greater mental ability and advance more rapidly than those of about the same caliber who have not attended college. He does not, however, give preference to college men; in fact, he avoids them, except in the few cases where he finds they are willing to begin at the bottom of the ladder and work their way up.

MR. ALBERT A. SPRAGUE,

President of Sprague, Warner & Company, Chicago.

Mr. Sprague does not answer the questions in full, but has this to say:

> I think the college education is neither a drawback nor an advantage in a commercial life, except in the greater resources it gives a man.

A man's success depends more upon himself than on his education.

He thinks that the college men who go into commercial life usually show greater mental ability than men without such education, and that "if they have the perseverance they advance more rapidly."

He says that in selecting help he does not give preference to college men, nor does he avoid them; that the proportion of college men in their employ is small.

AMERICAN SUGAR REFINING COMPANY,

New York.

In reply they state that they have no college men in their employ, so can not answer the questions.

MR. S. NORVELL,

President of Norvell-Shapleigh Hardware Company, St. Louis, Mo.

The writer says he does not give college men preference, nor does he avoid them, and that the proportion of such men in their employ is not over five per cent. He thinks they do not show greater mental ability, and that they do not advance more rapidly.

As to whether there is need of more than a grammar-school education in a general business life, he says:

"Yes, if a man reaches the higher-grade positions — No, if he does not."

Answering the question, whether the work and experience that a young man obtains in any line of

business develop the mental qualities required in that business fully as much as would a course in college, he says:

"Yes, but the development will be narrow, not broad. A man educated altogether in a business life, as a general thing, is more narrow in his views than a college-bred man."

He would not advise a young man with only $5,000 to spend it for a college education, if he intended to enter business.

His answer to the last question is to the effect that he would not, as a general rule, favor the college man, but he thinks that, in a few cases, a man with a college education would be worth twenty-five per cent more to him than a man without such education.

In addition to his answers to the questions, he makes the following general remarks:

> It may not be out of place to say, in concluding, that my observation of the work of college men has been that they lack concentration — they do not know how to economize time. They are not willing to sacrifice present comforts and convenience for the possibility of future gain. At college they do not seem to teach either the value of time or how it may be saved. After several years of leisure and the independence of a college life, a young man who enters one of our large, modern business houses finds himself sadly out of place and out of touch with his surroundings.
>
> It seems to me that it is a very natural result of the habits formed in college that so many college men find life on Western ranches, in mines, or in outdoor work generally more to their liking than the confinement and restrictions of a business house. * * *
>
> My experience in business with college men has not been in their favor. If I decide to have my son follow a business career, I will not send him to college.

MR. E. S. CONWAY,

Secretary of the W. W. Kimball Company, Chicago.

Mr. Conway states that the proportion of college men in their employ is four per cent; that he does not give preference to nor does he avoid college men, and that his experience has been that the college graduate does not, as a rule, show greater mental ability, but he thinks he should.

In reply to the question, whether he thinks there is need of more than a grammar-school education in a general business life, he says: "We are sure that all else being equal, a college education should be an advantage to a young man entering business life."

He closes his letter with the following remarks:

> If all young men who desire a college education, and are able to attain it, returning from college at twenty-two or twenty-three, with their feet flat on the ground, and a willingness on their part to begin at the bottom, working in the primary school of business with boys of fifteen or sixteen years of age, and never refer to the fact that they are college bred, but are content with the consciousness that they have a good foundation and apply their energies to their business undertaking, such college graduates will stand a good chance before middle life of passing the boy who began his business life five or six years earlier, but without the college education.
>
> In making the above statement, I wish to emphasize the fact that my own experience as to college men in business has been limited, for the reason that the majority begin with us at sixteen or seventeen and work up, or out. If the college man, with a literary education only, goes into business, he comes into competition with young men who have been learning business details for five or six years, which is a heavy handicap, and can only be overcome, if at all, by superior application, which is quite as likely to be developed by the boy who went out to work at sixteen.

Considering education in a broad way as training, not confined to colleges or classrooms, it is evident that the successful business man must have education, whether he acquire it at college or digs it out; but I believe that the qualities on which the successful business man depends — staying power, grasp, accurate knowledge of values and ability to execute — are not products of the classroom as distinguished from the shop and the office.

MR. WILLIAM SELLERS,

President of William Sellers Company, Incorporated, Philadelphia.

Mr. Sellers states that he has a few college men in his employ, the proportion being about three-quarters of one per cent.

His answers to the other questions are so coupled with conditions that I do not quote them, as they would throw no light on the subject.

MR. HENRY W. CRAMP,

Vice-President of the William Cramp & Sons Ship & Engine Building Company, Philadelphia.

Without taking up *seriatim* your questions as to the employment here of college men, or men who have not enjoyed a collegiate education, we will say, generally, that such questions cut no figure whatever with us in selecting a man for any position in our employ. We employ men solely with reference to their capacity for the work which we desire them to do, and it is entirely immaterial to us how, when or where, or by what kind of process, they acquired the education and training that may fit them for their duties.

MR. EDWIN REYNOLDS,

With Allis-Chalmers Company, Milwaukee.

While he apparently favors college education, Mr. Reynolds has replied to only a few of the questions,

and these answers are so hedged with conditions that it is impossible to find any clear-cut expressions to quote.

He states that the proportion of college men in their employ would probably be not over five per cent, and his letter does not indicate that he makes any pretense of hiring such men, or that he has given the subject special consideration.

MR. L. A. CARTON,

Treasurer, Swift & Company, Chicago.

The views expressed by Mr. Carton on this subject are not exactly clear, and it seems evident from his letters that he has given it but little thought, and has not had sufficient experience with college men to enable him to form any judgment.

He says the proportion of college men working for them is less than one per cent, and makes the remark that he does not believe their business is attractive to men who have had advanced educational facilities, but I can not see why the work in their office should differ materially from office work in any other line of business.

CHAPTER V.

CRITICISMS OF THE FOREGOING LETTERS.

To you, young men, who are thinking of going to college, and for whose especial benefit this investigation has been made, I think, in commenting on the foregoing letters, I am justified in saying that, notwithstanding some of these business men seem quite warm in their preference for college men in their business, the facts are that there is no satisfactory evidence that a single one of them is a consistent believer in college men.

Not one of them recommends that a young man with only $5,000 should spend it for a college education. The only ones who really show favor to college men are Mr. Antisdel and Mr. Simmons, and they being only recent converts, it remains to be seen whether they hold out.

Aside from these two there are several who favor college men for the highest positions; but I advise you not to go to college expecting one of the higher positions, for you will surely get left.

Mr. Merrill's letter is a bright and shining example of the difference between theory and practice, a difference to which I have already had occasion to refer. For some reason best known to himself, Mr. Merrill is enthusiastically in favor of the college graduate in business until it comes to employing him in his own; then his interest seems to have evaporated.

While Mr. Tuttle apparently favors college men, his statements would have been much more satisfactory had he answered all the questions, and shown what proportion of his men were college bred, and whether he had really made any practice of employing such men and giving them preference.

Here is the first of many occurrences of a phrase ("all other things being equal") which seems to have a peculiar fascination for my correspondents on this subject. In one form or another it appears in so many of the replies that one would suppose that it seems to them especially logical and satisfactory. Now, the fact is that, in the very nature of the case, it is simply impossible that other things should be equal; that is just the fallacy which I am combating throughout this book. But this point is considered more at length on page 85.

That Mr. Harris gets mixed on his lines of college education is not so much to be wondered at, considering how illustrious an example he has in the President of Harvard, as already noted. He has nothing to contribute to the real point at issue except his "impressions." But his actions speak louder than his words, for the best he can say is that he has "some" college men among his employees.

Then he falls back on that amusing stock phrase, already noticed — "all things being equal" — which seems to mean so much and really means nothing.

Mr. Ripley affords an amusing example of hedging. After saying the best he can for the college graduate in business, he seems suddenly to have bethought himself that he had gone too far, and so proceeds to upset his own argument by taking exactly the same view of the matter for which I have been contending all along.

In the latter part of his letter the only serious error is that he limits the loss of time to four years in college. To that must be added at least four years spent in preparation for college, making a total of eight years lost out of the best part of a young man's life.

A great many of my correspondents manifested a strong disposition to give me their "impressions" and "convictions" rather than facts, and to this Mr. Hughitt was no exception. Giving his "convictions" is the natural resort of the man who has no facts to offer.

The argument that the answer to my questions "depends upon the boy" is also a prime favorite, being used in various forms by several of the letter writers. I have answered it at length on page 85.

The views of Chauncey M. Depew, which Mr. Smink endorses so warmly, must be an extract from some after-dinner speech at some college banquet, where the genial Chauncey, having dined and wined well, naturally felt drawn to say all the nice things he could think of about college graduates.

As to Mr. Smink himself, he is only another case of theory and practice traveling in opposite directions. It will be noticed that he states that the industries with which he is connected have few college men in their employ, the proportion of these men to the whole being, as he says, "almost infinitesimal." This would seem to me to be an indication that he does not carry out his theories in practice. The only valuable part of his letter is that in which he draws so good a picture of the conceit of the college graduate; which agrees perfectly with what I have said on that subject on page 102.

In regard to Mr. Hyman's criticism I will say only

this: How can the scope of my inquiry be "too narrow," when it involves the welfare of thousands of young men who are graduated every year from the academic department of our colleges, knowing full well that they must make their own way in business life and imagining that the education which they have acquired at such a cost of effort time and money will be a help to them?

What Mr. McCormick has to say about "the same endowment," "same environment," and "same opportunities," is the same old idea, under a different form, of "all other things being equal," which I have exploded on page 85.

Mr. Antisdel's argument betrays the same "structural weakness" as that of so many others, for, by his own admissions, he has given the matter little thought and that recently. Naturally, therefore, he falls back on the meaningless stock phrase of "everything else being equal."

The letter from Armour & Co., like so many others, tries to face both ways at once. It would seem as though there were very few business houses where greater opportunities existed for utilizing college men, if they possess the merits which the writer of this letter seems to think they have. As they have few such men in their employ, it is evident that the importance of hiring college men has not made a strong impression upon them.

The latter part of Mr. Conway's letter contains all that I care to notice, for it concedes the exact position I have taken all along. It is useless for Mr. Conway, or any one else, to speculate on what might be if the college graduate were altogether different from what he is. "A willingness to begin at the bottom" and

" never to refer to the fact that they are college bred," is just what does *not* distinguish college graduates.

These men certainly are among the strongest and best men in the country for information on this subject, and it is surprising what a mess most of them have made in answering my letters.

Certain Deductions.

The surprising thing in most of these letters is that so many of the writers seem to think they are under some obligation to say something encouraging about college education. They do not seem to realize that this is a most important matter, and that I am trying to get some solid and substantial information for the benefit of young men. It is sadly out of place for them to disguise facts or to do anything to mislead. Many of them make the statement that there is need of more than a common-school education in a commercial life, and that there is something about the mental training and mental discipline which a young man receives at college that is of great value to him in business, enabling him to grasp questions and reason out matters more readily than one who has not attended college. It will be observed, however, that with two or three exceptions, none of these gentlemen appears to make a point of employing such men in his business.

Railroad Men.

In this connection I wish to call especial attention to the letters from Mr. Merrill and Mr. Welling.

If college men possess the qualifications which these gentlemen claim for them, is it not strange that the

great corporations with which they are connected have not employed them more extensively, for they have much greater opportunities to utilize such men than any other class of employers?

It seems to me that there is no branch of work in which there is greater need of men who possess good tact and general ability than in the position of station agents, and the fact that so few college graduates are found among them I think fully confirms my claim that anything further in the way of school training than can be obtained by the time a boy leaves the grammar grades would be of no advantage whatever to persons in the above, or, in fact, almost any other department of railroad work.

Considering the fact that the hundreds of men at the heads of railroads throughout this country have been able to conduct their business successfully, although possessing only a moderate amount of education, and that the college graduate is conspicuously scarce in the higher positions in the railway service, it seems to me the height of absurdity for any one to claim that the subordinate positions require highly educated men. To do so is equivalent to saying that a person who might be capable of filling the position of president of a road is insufficiently educated to occupy one of the minor positions; and what is true of the railway business is, of course, equally true of a mercantile business.

Much has been said in various ways in connection with this subject in regard to higher education being favored by railroad men, but in the letters that I have received from such gentlemen not one of them has expressed any regret on account of having failed to receive such an education himself.

This phase of the subject is treated more specifically in Chapter VII of Part Two.

"Everything Else Being Equal."

Many business men, in theorizing on this subject, have said that they would give preference to college-bred men, "everything else being equal"; or, "all other things being equal."

They do not state just what they mean by this remark, but I presume it is their idea that, if they had to choose between two young men of equal natural abilities, one being a college graduate and the other not, they would favor the college man. It will be seen, however, upon reflection, that this is not a supposable case; that is, there is no such thing in this instance as "everything else being equal." For it must be assumed that the young man who did not go to college has gained about eight years' experience in the line of work in which he is seeking employment, in consequence of which he has a thorough knowledge of the business; and it will be found that in every instance the employer will give him preference over the young man who is just leaving college.

"Would Depend Upon the Boy."

In response to the question whether they would advise a boy to go to college, some of these gentlemen say that this would "depend upon the boy."

Here again they fail to explain their meaning, but I imagine that where a boy appears to have a capacity for absorbing knowledge in the grammar school, keeps well up toward the head of his class, and is persistent in his desire to go to college, they would advise his

doing so. If this is their idea, then the question arises, Why would they recommend his pursuing this course in preference to taking up some line of work? The mere fact that he shows a capacity for learning and has a notion that it is a desirable thing to go to college is certainly no proof whatever that such an education would be of value to him, and I maintain that these gentlemen, instead of advising him to take such a course, ought to have corrected his mistaken theories on this subject in the same manner that I am now endeavoring to do.

The Usual Method of Employing.

The truth of the matter is that, when it comes to considering an applicant for a position, none of these business men will be found to pay any attention to the amount of knowledge a man may have of Greek, Latin, literature, etc., or care a straw about the mental drill and discipline, or the well-rounded character that he may have acquired through a course at college.

The only thing that interests them is whether he understands their business and can promote it. This is all that has any weight with them in the selection of help — a truth which can not be impressed too strongly upon every candidate for commercial pursuits.

I regard the letters from Mr. Townsend, President of Importers' and Traders' Bank, New York, and Mr. Dau, of Reid, Murdoch & Co., as being decidedly the most accurate and the most businesslike of all the replies received, and I believe it will be found that the method which they say is followed in their business is the custom of practically all business men — that is, they take boys about sixteen years of age who have attended the common grammar schools and train them

in their own methods, advancing them as they prove worthy and as the business requires. Not only is this the most economical way, but civil service and fair play demand that young men who show themselves worthy and capable should be promoted.

Every young man ought to realize that if he is to receive advancement, he must make himself worthy of it, and when he proves himself deserving, it is an injustice to deprive him of promotion by bringing in outside help, such as college graduates. Besides, if outsiders are hired for such advanced positions, the chances are that, three times out of four, a mistake will be made, and the experiment will result in a waste of time and money. On the other hand, an employer is in little danger of making an error when he promotes young men who have been educated in his establishment, for he has had plenty of opportunity to acquaint himself with their characters and capabilities.

A College Graduate's Experience.

In this connection some remarks made by a college graduate in an unsolicited letter recently sent to me no doubt will be of interest, for I believe that practically all college men, who possess no business experience, meet with similar difficulties when seeking employment, and that this letter shows clearly the attitude of business men toward them. The general character of his letter is such as to make a favorable impression upon any one receiving it — I think much more so than ninety-nine out of a hundred from college men — and in view of his experience it is easy to imagine what that of others must be.

After discussing some questions which are not

relevant to this investigation, this graduate takes the ground that experience is far more valuable than theories in any discussion of this kind — with which view I fully agree. He then goes on to say:

> I think that my experience may be taken as a pretty fair test of the value of a college education in "hustling for a job." Summarized, it stood thus: I answered over 450 "ads." of all kinds, taking every precaution to make my replies as businesslike and convincing as possible; sent out over seventy typewritten applications to picked addresses; and made innumerable applications in person. In almost every case I was met by the same fatal question, What do you know about our business? In Chicago, at any rate, the employer makes it the first condition of engagement that you shall know about his business; if you lack that qualification he cares not how fine your personal qualities may be, how excellent your mental capacity, how faithful your zeal. He will not give you even a chance to show what you can do.
>
> Does some one say that the reason why the college man can not find a business position is because he is too proud to begin at the bottom and work his way up? There again appears the ignorance of those who theorize about that which they never tried. In this city, at least, employers of business help will not take a man who is nearly twenty-five years of age as a beginner without business experience. They want young fellows in their teens, and so specify in their "ads."; of course they can get plenty of them. They are cheaper, will last longer, and are more easily reduced to mere cogs in the business machine. A college man knows too many other things.
>
> As a last resort I even applied to Mr. A. C. Bartlett. In my innocence I imagined that the friend and advocate of the college graduate in business might consider my exceptional character, references and general capacity to be so much of an offset to my ignorance of hardware quotations that he might be willing to utilize my ability and reliability in some corner of his large business. He

assured me politely but positively that he could not use a man in his business who did not know it from the bottom up!

There is no more pitiful object, so far as I know, than a young man coming out of college and seeking a job. He finds he gets the cold shoulder from every one he meets; that the people who recommended the college to him have humbugged him to the last degree, and now, when it is too late, he finds how utterly false have been all the claims as to the advantages of a college education.

CHAPTER VI.

FURTHER MISREPRESENTATIONS OF EDUCATORS.

In addition to the false statements made by the heads of colleges in their replies to my letter of inquiry, as referred to in Chapter II of this part, I call attention to the following falsehoods and misrepresentations that have been gathered during this investigation.

President Jordan's Extravagant Claims.

Dr. David Starr Jordan, President of Leland Stanford, Jr., University, has written at considerable length upon this subject in a recent issue of the *Independent,* but it is unnecessary to reply to his argument in detail, since it is sufficiently covered by the pages of this book. He is most emphatic in his claims for the value of college education to the business man, but his claims manifest the usual confusion of ideas and impracticability of the college educator when he undertakes to deal with business questions. The notion which he, in common with most of the college presidents, entertains with regard to the helpfulness of breadth of education to the young man who must hustle for himself in commercial life, is absolutely erroneous. On the contrary, it is much more likely to injure his chances.

It remains only to give attention to some of his unjustifiable remarks. He says that this is the "era of great projects, of great achievements," and that

"the business of to-day and of the future demands a higher grade of intelligence and a more highly specialized ability than the individual commerce of a generation ago. It therefore demands higher training."

My reply to this is: If college men have not been able to demonstrate their worth in the smaller operations of the past, it is absurd to claim that they will be in greater demand in the larger operations upon which we are now entering.

In another place President Jordan says: "It is when exceptional effort or exceptional responsibility is demanded that training shows itself. The exceptional man places himself in line for just such possibilities."

To this idea I have replied elsewhere in this book. Here I will say only that, if President Jordan's statements were correct, college men would be in great demand by business men instead of being shunned by them.

As the keenness of competition to-day is such that no man can afford to neglect the utilization of all kinds of help that will promote his business, business men would be as keen to hire such men as they would be to buy improved methods and machinery.

College Captains of Industry.

But the most astounding of President Jordan's claims is found in this: "Of all the business men of the world, those sent out from the American university are the most alert, the most enlightened, the keenest of mind and the most effective in action. These are our captains of industry, and the young fellows who have worked their way from the streets to the counting-room as cash boys, errand boys and appren-

tices, must continue, a few bright individuals excepted, to plod along in the ranks!"

What a rhetorical balloon! Not one of the captains — or, more accurately speaking, generals of industry — so far as I am able to ascertain, has been through college. President Jordan should be more careful in his statements.

In another place I find this: "Mr. Irving M. Scott, of the Union Iron Works, the builder of the Oregon, has among his employees numerous graduates of Cornell and Stanford. He told me the other day that he regarded a university man as worth fifty per cent more than a man who had come up to the same level by practical experience." President Jordan is mistaken, for I ascertained by correspondence with Mr. Scott that he referred to technical men only.

He speaks in a rather contemptuous way of the people who grow up from the lower positions of cash boys, floorwalkers, clerks, etc.; which seems to me exceedingly poor taste. He should remember that it was in just such positions as these that Mr. Carnegie and many others of our successful men started, and I think this remark shows the contempt for honest labor which is altogether too prevalent among the educational classes. For my part, I have a greater respect for honest labor than for men who make their living by sharp practice and by humbugging the public. President Jordan appears to forget that he owes his job at Leland Stanford to one of those men, who, I presume, never had a college education.

But there is hope yet for President Jordan, for he admits that in the past the college has not been doing as good work as it ought to or could have done. This seems to be the idea now of practically all college men.

The Testimony of Mr. Andrew Carnegie.

Some time ago I noticed that one of these college advocates, in an attempt to bolster up the importance of college education, made the claim that Mr. Carnegie had said he owed his prosperity to college men. The following extracts from his book, "The Empire of Business," show how false such a statement really is:

> In my own experience I can say that I have known few young men intended for business who were not injured by a collegiate education. Had they gone into active work during the years spent at college they would have been better educated men in every true sense of that term. The fire and energy have been stamped out of them, and how to so manage as to live a life of idleness and not a life of usefulness has become the chief question with them. * * *
>
> I have inquired and searched everywhere, in all quarters, but find small trace of him as a leader in affairs, although not seldom occupying positions of trust in financial institutions. Nor is this surprising. The prize-takers have too many years the start of the graduate — they have entered for the race invariably in their teens — in the most valuable of all the years for learning — from fourteen to twenty. * * *
>
> The almost total absence of the graduate from high positions in the business world would seem to justify the conclusion that college education as it exists seems almost fatal to success in that domain. * * *
>
> A captain of industry is one who makes his all in his business and depends upon success for compensation. It is in this field that the graduate has little chance, entering at twenty, against the boy who swept the office or who begins as shipping-clerk at fourteen. The facts prove this.

Prof. Chaplin's Fatal Admissions.

Especially feeble was the plea of Professor Chaplin, of Washington University, St. Louis, in a recent

article which, I think, was inspired by the first edition of my book. After practically admitting that there is not much to show for college education, he says, in conclusion, that we must take it on faith and that a hundred years hence a very different state of things will be seen in this country as a result of college education. This position is similar to that taken by the Milwaukee *Sentinel* when commenting upon my book.

Thus it will be seen, from their own admissions, that when college advocates undertake to produce evidence in support of their institutions, they make a most dismal failure. It certainly is asking altogether too much to request the public to wait another hundred years for colleges to demonstrate their worth.

COMMERCIAL-COLLEGE EDUCATION.

The following is my reply to a letter received from Professor Clark, of the Leland Stanford, Jr., University, which it is unnecessary to print, since the reply explains the letter:

CHICAGO, May 9, 1902.

With reference to your suggestion regarding the introduction of business training in a college curriculum, I would say that, while this would perhaps be an improvement upon the old methods, I find that I am so entirely out of accord with everything in the line of higher education, that I can not bring myself to the point of encouraging you in the changes which you propose.

Of course, anything in the way of study that is along the lines of practical education possesses some advantages, and it might be possible that colleges could pick out some such lines in which a young man could, by systematic application, make more rapid advancement than he would be able to do in an office.

I am, however, very strongly of the opinion that these institutions can not be made useful to business men in the

production of help, and that it is a great mistake for a young man who expects to enter upon a business career to spend his time and money taking a course in college.

The Best Course.

It is my belief that it is infinitely better for him to go into an office at the age of, say sixteen, for by so doing he will be earning something, instead of being under a large expense; at the same time he will be acquiring information along the line of work which he expects to follow, as well as learning a hundred and one things that will be more or less useful to him later in life and which he could not possibly obtain a knowledge of at college.

As to your suggestion in regard to the study of stenography, of course stenographers are in great demand, but young men who wish to take up that branch had better attend some school for that particular purpose.

With regard to bookkeeping, it seems to me that the rules covering this branch of work could be very easily published, if this is not already done, so that those desiring to study it could do so at home as well as in school.

The ordinary bookkeeper is in more or less demand in the smaller institutions, and a young man will undoubtedly find that a knowledge of this work is advantageous. I presume, however, that the great mass of bookkeepers are produced in the same way as the majority of mechanics — that is, they commence in an office just as an apprentice does in a factory, and advance from one line to another as they grow up, in this way becoming proficient in some branch of work without any cost.

Mechanical Education.

Referring to what you have to say concerning practical training in mechanical lines, I do not think this cuts any figure whatever so far as the making of mechanics is concerned. If such young men as you turn out had been put at some mechanical work while they were young, they might have stayed at it and become mechanics; but

after going through such a school as you propose, they are spoiled for anything of that kind, and while the mechanical work that they learn there may be of some advantage to them in after life, it really cuts no figure in the question of education.

Should your proposition be carried out, I contend we would run into the same mistake that is met with in what are called "trade schools," which are popular with theoretical educators at the present time. As business is now conducted, the boys are earning their living while acquiring their trade, and if they can do this, what necessity is there for "trade schools"?

Demand and Supply.

Persons in your proposed line should bear in mind that they ought to produce something for which there is a demand; and further, that it is not sufficient when the demand comes from simply a few persons; it should be such a demand as to take all the young men of this kind that the colleges can turn out. In other words, these institutions should be conducted upon the same principles upon which a man runs his factory. If a manufacturer expects to succeed in his business, he is compelled, by competition, to produce an article that will sell at a profit, and must look forward to see whether there is a demand for his product. It will not do for him to turn out goods for which there is no demand, or produce them at a price which will not admit of their being sold at a profit. A man who should go to work, for instance, and build a hundred air-ships without knowing that they would be in demand or that he could get his money out of them, would most certainly be considered crazy.

Should you disagree with the views that I have herein expressed, I would suggest that you submit your curriculum, with full particulars, to some of the gentlemen who claim to have a favorable opinion regarding the value of college education, say Mr. W. F. Merrill (Vice-President, N. Y., N. H. & H. R. R. Co.), Mr. A. C. Bartlett (Vice-President, Hibbard, Spencer, Bartlett & Co., Chicago), or Mr. E. C. Simmons (Simmons Hardware

Company, St. Louis), and request them to give you an order for some of the students who will graduate from your college.

The situation has not changed since the foregoing letter was written. In the commercial life of to-day the young man who had nothing more than a grammar-school education makes as creditable a showing as the young man who took a course in a business college. One is as likely to be efficient as the other, each being judged by the amount of brains and intelligence applied to his work.

I know this to be true of our own offices. Hundreds of clerks are in our employ. The amount of formal education they received had little, if anything, to do with their employment. And it is the opinion of the official in charge that the clerks who did not have a business-college education would be no more valuable to the business to-day if they had taken such a course, nor would their success have been greater.

I am safe in saying that in general those of our clerks who had a commercial education have been no more successful or efficient than those who got all of their formal education in the public grammar schools. We have proved that, for a boy with good intelligence, energy and ambition, a year in the business itself is worth two years in a business college.

CHAPTER VII.

GENERAL DISCUSSION OF THE SUBJECT.

Words of Wisdom.

The best education in the world is that got by struggling to make a living. Wendell Phillips.

The true order of learning should be, first, what is necessary; second, what is useful, and third, what is ornamental. To reverse this arrangement is like beginning to build at the top of the edifice.

Mrs. Sigourney.

There are three classes of people in the world. The first learn from their own experience — these are the wise; the second learn from the experience of others — these are the happy; the third learn neither from their own experience nor from that of others — these are fools.

Chesterfield.

The Importance of Starting Right in Life.

Having laid before the reader the views of both college educators and business men, I now desire to impress upon young men seeking a college education the vital importance to them of a wise choice. Too much stress can not be laid upon this. Life is too short, and the path to success too long, to permit indulging in the luxury of making mistakes.

The years which a young man spends in college are decidedly the most important and valuable in his life. It is during this period that he usually lays the foundation for his life's work, and not the slightest

doubt should be allowed to exist regarding the utility of the occupation to which he devotes this time. When he arrives at the age of manhood, it is expected that he will be at least self-supporting and prepared to assume the responsibilities of manhood.

Many young men receive an erroneous impression regarding the value of a college education, and think, as the president of a western college once remarked in his address to a graduating class, that upon leaving college they can go out and pick up gold bricks in the street. It is only after they have spent their valuable time in college and have started out to earn a living that they find their higher education is practically of no advantage to them; that they must commence at the foot of the ladder, which they could have done better eight years before, and would now be earning a reasonable salary.

In other words, not until then do they learn the truth of this college president's further remark that the bricks referred to are fastened down tight. I think they will also discover that, instead of their college education making them especially skilful in loosening the bricks, it really has the opposite effect, and that they are less able to accomplish this task than the man who did not go to college. Are not the heads of these institutions treating boys unjustly when they allow them to go through college under this misapprehension, and fail to enlighten them upon this subject before they have spent their time and money and are about to go out into the world?

Cost of a College Education.

The answers from college presidents to the question regarding the cost of educating a student have been

omitted, because several have given no information at all upon this point, and I think those who attempted to do so have been mistaken in their figures.

For the purpose of my inquiry this question should be considered in a strictly businesslike way, for it seems to me that education should be subjected to practically the same tests as to value as an ordinary commodity. To arrive at the total expense we should take into consideration not only the cost of tuition, but the amount which the boy would have earned had he been employed in some business occupation from the time he finished grammar school until his graduation from college, and also the difference between his earning capacity for several years after he does start in business and that of the young man who has not attended college, all of which I roughly estimate as amounting to from $10,000 to $12,000. When this sum is multiplied by the number of students turned out by these institutions every year, it will be seen what an enormous economic loss is involved. The $10,000 that is consumed in the education of a boy from grammar school through high school and college would buy a farm and put some one in a position to make a comfortable living.

Success With and Without Education.

In one of the letters from business men attention is called to an article by John W. Leonard, entitled, "College Education and Success," in which reference is made to some statistics in the book, "Who's Who in America," showing the number of successful men in this country who have had a college education.

This book is also referred to in a letter received from President McLean of the University of Iowa.

To this statement I reply that these men are exceedingly hard to find and that they are but a small percentage of the successful men of the country. But, even if they were successful as a rule, the question is, how much does this prove as against the men who made an equal success without education? The fact that college men become strong men does not prove anything, but the fact that men without education develop into strong men proves everything.

It is certainly remarkable that so few college men are what would be called a decided success in business, since they are the offspring of the strongest people of the country; so I think it only just to say that their failure to show more success is evidence that they have degenerated instead of improved.

I have no means of judging the correctness of those statistics or how successful such men have been in business, since there are all degrees of success; but I will say this, that probably not more than two or three of the pioneer business men in Chicago who have made a marked success in business ever attended college, and the remainder did not, as a rule, receive even a full grammar-school education. Practically all of our strongest and most successful men in the country to-day came from farms and villages and obtained very little education.

Evidence Should Be Easily Got.

If a college education were of any decided help to a man, there would be plenty of evidence for it before the public, and I should not be discussing this question.

Much has been said about the man who works his way through college being a person who is likely to obtain some benefits from it; but why this would apply

to such a man more than to any other person it would be difficult to explain. He may possibly get more out of college than the ordinary run of men, but there is no particular reason to imagine that he would get enough more out of it to be of any particular advantage to him more than to the general run of people. Such a person who is ambitious and willing to work, if he would apply the same energy to some business, in all probability would make a marked success.

I feel sure that if the men who have been successful in business were asked whether they regretted starting in business at the time they did, in place of going to college, and taking the chances of afterward being able to gain the success they have achieved, all would answer in the negative. No doubt, many successful men wish they had received a better education, for some of them are not sufficiently educated to be able to compose a letter correctly or express themselves clearly and properly in business matters, and have not acquired a taste for literature and many other things that contribute to one's happiness; but I contend that a grammar-school education would have been sufficient to place these men in the position they desire.

College Conceit and Pessimism.

In letters received from students, one of them says: "I believe the average college student learns to be a loafer and money-spender rather than a money-saver and energetic citizen"; and I think he might have added that a course in college has a tendency to make a young man conceited and unpractical, and creates in him something of a contempt for labor and for those who have not a college education.

I take the ground that a young man who goes to college not only is not benefited by it, after spending eight years in time and $10,000 to $12,000 in money, but is most decidedly and positively injured by the college, since he comes out so conceited that he is at a great disadvantage in getting into business, and it takes years, and sometimes a lifetime, to get his head back to a normal size. So much flattery and attention are often bestowed upon the college student that he becomes greatly conceited and thinks he knows it all, and that there is no necessity for him to exercise any reasoning powers. The whole tendency of the so-called "higher education" is to puff the young man up with vanity, causing him to look with contempt upon labor, and even to despise his parents; their suggestions that he should work for a living are resented by him, since he expects to live by his wits. Then, if wits fail to bring him success, he becomes pessimistic.

Object of Education.

The remark was once made by President Eliot, of Harvard, that the object of education is to make people happy, and I presume that this is its fundamental purpose. I do not imagine, however, that he meant by this that education or happiness applies simply to the man who is well educated in literature or languages or in the lines which are ordinarily understood to give polish and enable one to be an ornament to society, but that he referred in a broader sense to those persons who are educated in such branches as the arts, sciences, history, mathematics, physics, biology, chemistry, etc.

Whether he would go still further and include men who have had less book education and more practical

education, such as is acquired in manufacturing or mercantile industries, I am not sure; but if so, his remark would include a large variety of what might, in a way, be called educated men. I do not suppose he would take the ground that there is no happiness in this world except that which grows out of the ordinary college education, but would grant that happiness may be enjoyed by any one who has marked knowledge and that it makes little difference what branches his knowledge covers.

For illustration, take such men as Westinghouse, Edison, Cramp, Scott, and hundreds of others that might be mentioned. I contend that the happiness which the most learned college man gets out of life does not compare with that obtained by these men from their business. The greatest pleasure a man can have is that which arises from the feeling that he has been a success in a creditable occupation. On the contrary, the greatest unhappiness comes from the knowledge that one's life has been a failure, and it seems to me that the more a man has of "higher" education, the more severely will he feel this failure.

The Maximum of Happiness.

The great question for every one to decide is, what kind of education is going to yield him the most pleasure; and if he selects an occupation of an educational character that proves to be profitable as well as pleasurable, he certainly has a better chance for enjoyment than would be the case if he took up a line of education which returned him little or no profit.

But many writers claim that the pleasure which a man obtains through his college education more than compensates for the sacrifices which he has to make

to gain such education, and heretofore I have been inclined to grant part of this. But recently I have been informed by a person who has had much experience and opportunity for observing the lives of highly educated people, that there is little or nothing in this theory. He states that, as a rule, those people think just as much of money, dress and display, and apparently are little more resourceful in the way of making themselves and family happy than those not so educated; that they take just as much interest in worldly matters, and are fully as likely to live beyond their means in order to gratify their love of display as though there were no compensating results from their higher education. If this be true of the highest college-educated people, where do those of only ordinary college education get so much pleasure?

Furthermore, many educated men have acquired, just because of their associations, tastes which are beyond their means; and this, of course, tends to make them unhappy more than anything else.

Happiness from Success.

No doubt men of strong character who possess sufficient means to enable them to live without working will enjoy life more if they take a college course. It gives them a standing and position in society which affords them considerable pleasure, but, of course, this does not concern the public. At the same time, I think it is doubtful whether this class of men get more enjoyment out of life than those who have built up a successful business, yet who received only a moderate education. It is my opinion that a man with a college education, and a reasonably good income, will probably get as much enjoyment out of life as one who has a

considerably greater income but is without such education; also that an uneducated man with a good reliable income will be happier than one who has received an education but possesses a meager income.

Many of the college graduates refer in their letters to the happiness they have gained from their college training and experience, but I can not understand what particular reason they have for being happy. To claim that a man can be happy simply because he has a taste for literature is taking a very narrow view of the subject. He certainly has been of no benefit to mankind, and there is no reason why he ought to be happy — in fact, just the contrary should be the case. The only men entitled to happiness in this world are those who are useful.

False Pride.

If, as will be noticed later, college graduates usually forget a great part of what is taught them at college, their happiness can not be due to the knowledge gained there; hence, it would seem as though it must come simply from the false pride which they feel in having attended some prominent institution of this kind. Surely the large number of students who did not reply to my inquiry for the reason, as I have claimed in another part of this book, that they have been unsuccessful since leaving college, can not have gained much happiness from their college experience. Instead of adding to their pleasure and enjoyment in life, I think there is no doubt that it has had just the opposite effect.

In letters called forth by this investigation much has been said in regard to money not being the whole thing, and no doubt there is considerable truth in this statement; many people become avaricious and un-

scrupulous in their desire to obtain wealth, and succeed in acquiring altogether too much of it. At the same time nothing is gained in a matter of this kind by putting it in a false position. If money is not the whole thing, I think it is safe to say that it is probably seventy-five per cent of the whole thing. As a rule, the fact is that money is looked upon with contempt only by those who have not got it and do not know how to obtain it.

When Is a Man Educated?

One of the college graduates remarks that he has forgotten nearly everything he learned at college, and that all the benefit he received there was the "mental drill." I have frequently heard other college graduates express themselves in the same manner, that they remembered very little of what they learned in college. If this be true, the question naturally arises, how can such persons be considered educated? I should think that they might more appropriately be classed with the uneducated.

Even if a man has attended one of the best institutions of learning in the country and has retained all the knowledge that was taught him there, I contend that he is not to be compared with one who, though not having received a college education, is an extensive traveler, reader and observer, and has from his association with different people acquired a large amount of general information that is useful to himself or to the public.

It is often claimed that the college is a great place for learning self-reliance and for acquiring knowledge of human nature. It is true that the student meets many others in his three or four years in college, but it

is equally true that students present a large degree of similarity. Generally speaking, the student's associates are all like himself, of about the same age, from the well-to-do and educated classes, all having similar prejudices, ideas and ideals.

Furthermore, the college is a kind of sheltered nest where the young man grows his wings protected from storms and the rude jostling of the crowd, and where he breathes an atmosphere of tradition and sentiment altogether foreign to that of the world of affairs. His collegiate triumphs are won with comparative ease and bring him an inordinate amount of petting from classmates and admiring friends, so that when it comes time for him to fall out of the college nest into the hard, practical world he has acquired a most tremendous opinion of his own importance.

The Best College Is the World.

That this is true is proved by the sickening shock experienced by so many college graduates when they strike out into the world and find themselves obliged to stand on their own feet in the midst of a pushing crowd which has no awe of a diploma and despises culture. When the young man wakes from his dream and realizes the cold truth that he is nobody, in spite of his sheepskin, one of two things happens. If he has the right stuff in him, he puts the dream behind him and strikes out manfully for himself as if it had never been; but too often he persists in blind self-esteem and goes through life a pitiful failure, blaming the world to the last for refusing to recognize his superiority. No, the world is the best college for acquiring knowledge of all kinds of human nature — good, bad and indifferent.

As for the " mental drill " and discipline that young

men are said to receive at college, while I have no doubt that there might be something in this if it were done systematically and with discretion, I claim that it does not begin to compare with that which a man obtains in building up a business where he has to meet competition and in hundreds of ways has to "rub up against the other fellow." Take also the man on the road selling goods; he knows that if he returns without having made sales he is likely to be called upon pretty sharply. There is nothing so good for a man or that will give him so much keenness as being compelled to struggle in business.

The young business man is in a position to realize much more fully than the man in college possibly can, the importance of informing himself along the particular lines which will be beneficial to him in his occupation. If he wishes at any time to acquire knowledge, either for this purpose or to enable him to enjoy life better, he will find plenty of opportunities for doing so outside of college, for teachers can not supply any information that is not already contained in books.

I am inclined to the belief that the real difficulty is found not so much in the education taught at college as in the educators themselves, and in the ridiculous prominence which the public gives to the various athletic and other exhibitions of college societies.

College Men Have No Special Ability.

While my chief aim in this investigation has been to show whether or not the colleges offer any advantage to young men in preparing for a *business* life, the discussion of the question naturally leads up to various general claims that are made for higher education, and it may be well to consider briefly whether the col-

leges have sufficient merit in these other directions to warrant their existence.

The great claim of college advocates is that these institutions are turning out men who, by reason of their broader views, greater mental ability and stronger character, are capable of wielding a larger influence and accomplishing more good for their country than those who have not received such an education. It will be found that this theory is no more supported by the facts than is their claim regarding the advantages of a college education for business men, which has been completely exploded by my investigation.

I claim that there is no evidence that college men possess higher character than other people. In fact, my experience with them in this investigation would rather prove the contrary and that they are not men of veracity, and without this quality I do not understand that men can have character.

Instead of the college having the effect of training and disciplining the young man's mind and making him better able to reason out matters, as so many people claim, the fact is that exactly the opposite is the case. The student's head seems to be so stuffed with unimportant things that there is no room for absorbing useful knowledge. In other words, he has become so theoretical that he is not capable of being practical. I must admit that I find it difficult to understand why this is so. Education certainly ought not to make a man stupid, and upon leaving college he should have at least as much brains as when he entered, besides which he should have acquired some useful knowledge there.

In addition to the great claims that the advocates of colleges make in regard to the mental drill and discipline, etc., which a man gains by a course in college,

they have much to say about the advantage it is to a man in the way of research. I am at a loss to understand how there can be anything special in this feature. As all libraries have the various subjects tabulated, I can see no reason why persons desiring any special knowledge can not be placed in the way of finding it by the librarians.

Educators Do Not Agree.

I contend that not only are college-bred men seldom found to be conspicuous in the great moral questions affecting the welfare and happiness of mankind, but the superior advantages which their friends would have us believe they enjoy have not conferred upon them any special ability for arriving at the truth in important questions. This is proved by the fact that they are quite as likely to be at variance in their opinions as the uneducated. A good illustration of this was furnished by a meeting of college professors at Detroit some years ago. Not a single question came up on which these men could agree unanimously; in fact, one of them took the position that the teaching of the three R's in the common schools was a great mistake. The same condition will be found to exist in all their meetings.

Recently other professors have expressed themselves as not at all in favor of the present college course, and great confusion exists among these educators to-day as to what they should teach. The only thing that they practically do agree upon is that the college is not doing the right kind of work.

Some college presidents, apologizing for not showing better results from college men, make the statement that they can not make a whistle out of a pig's tail.

While I agree with them in this, I think such an excuse comes with very poor grace from men who are all the time taking these pigs' tails and undertaking to make whistles out of them, consuming their time and money and withholding this information until it is too late.

A Practical Surrender.

One of the best proofs of the correctness of my position on this subject is furnished by the action of the college authorities themselves. On all sides they are hastening to make good the very defect which I have been criticizing, by establishing business courses as part of the regular college curriculum. The University of Wisconsin, Northwestern University, the University of Chicago and others have either begun such courses or are about to do so. Even President Jordan has seen a great light, for he admits that business courses might be included in college education, and declares that they shall be adopted in his institution as soon as there is a public demand for them! Which is only another way of saying that he does not propose to let any students get away if he can hold them.

While I am glad to see such a stirring among the dry bones, and shall do what I can to stir them some more, at the same time I can not regard this new departure as any gain to the public. All it signifies is that the universities, for the sake of adding to their attendance of students, are adding to their already sufficiently complicated machinery a department which has long been occupied by the exclusively business college, and more satisfactorily than the university can possibly hope to do.

The only plea which the university can put forward to justify an invasion of the business college's province

is that of giving the young business man a broader education. But breadth and theories are just what the young man does not need for business success, as I have already fully explained. So even here the universities are on the wrong track.

"College Aristocracy."

Owing to the fact that so many well-to-do people send their boys to college, many persons of moderate means get the impression that it is an exceedingly advantageous thing to do. Hence the enormous sacrifice made by many parents that their sons may have a college education.

Most of the well-to-do persons who do send their sons to college know that there is little or nothing of value in the education received. It simply is the fashionable thing to go to college, and so they send their boys, in order that they may get into the "college aristocracy."

These parents seem to have a fear that their boys will have no social standing unless they are graduates of some important college. And if their boys can say in addition to being graduates that they are members of some fraternity or belong to such-and-such a university club, their social position is assured.

As the colleges have no merit as institutions of learning, their chief object seems to be to sell certificates that will enable the holders to enter society. But even with this college passport the holder is not always successful.

The man of real merit and real character, of brains and ability, needs no college diploma to enable him to enter society, nor does he seek a place in society. As he really amounts to something in himself, society begs

for his favors and considers itself honored if he should have the inclination and can find the time to enter and become a part of it. It is the presence of such men within the inner circles of the highest society that makes the man with little but his college passport look like the pigmy he is.

College-bred society men, as a rule, do not amount to anything, and as they are graduates from the "college aristocracy" it is evident that the colleges are busily engaged in building up in this country — where nothing but an aristocracy of brains should be recognized — an aristocracy of "numskulls," or, as Horace Greeley might have put it, an aristocracy of "horned cattle."

This pastime may be all right for the sons of rich men who can afford to make fools of themselves; but it is nothing short of a calamity for the poor boys who go to college with the idea that there is something in it, and who can not afford to make mistakes.

This shoddy side of the colleges is fostered by the fool parents who crowd to football games and college glee-club concerts, making social functions of them, and doing their little best to make it appear that the college youth is a superior sort of person.

The same is true to a large extent of the men who support the colleges; and the college president deigns to step down from his pedestal long enough to treat them as equals and to assure them that in return for their money he will "O. K." them as being of good moral character and fit to "enter society."

So the college, in a land where only brains and good character coupled with fair play and industry should count, exercises, through its flimsy aristocracy, a sort of petty tyranny, striving to dominate the social

activities of the people, and selling its favors as the aristocracy of Europe does.

Is it not time for us to arise and in the strength of our might thrown off this miserable, fraudulent yoke of the colleges? Is it not time for all of us to realize that it is infinitely better for us to have boys who amount to something than boys who can do nothing but shine with a borrowed light?

Colleges Patronized by the Rich.

Probably one of the strongest arguments in favor of colleges is the fact that, as a rule, the most successful business men in the country send their sons there. But whether these gentlemen do so with the expectation that the boys will thereby become better business men, or because of the feeling that it will enable them to become more valuable members of society and get more enjoyment out of life, is a question. As such young men do not have to make the struggle which their fathers did to establish a business, possibly they can afford to indulge in this luxury, but so far as its benefiting them in a commercial way is concerned, I claim that the general results of education will apply to this class of young men as well as to others who go to college. We find large numbers of college graduates to-day who have come into a thoroughly established and successful business that their fathers had built up, and it remains to be seen how they will turn out.

The fact that many of our prominent business men support colleges probably is looked upon as another argument in favor of such institutions. But we have no explanation from these men as to whether they contribute to colleges because a thorough investigation

has convinced them of the importance of these institutions, or because in this way they fancy they may get a reputation, the "O. K." of the college apparently covering a multitude of sins of commission and of omission.

Surely these subscribers to college funds must know that many young men who attend these institutions are practically ruined; yet the contributors do not seem to care a particle how much damage they do in this way with their money, so long as they can secure the approval, the "certificate of character," of the colleges.

Top-heavy Education.

It is strange to me that the people who are doing their utmost to maintain and multiply colleges can not see that they are making our educational system dangerously top-heavy. No wise man attempts to build the upper stories of his house until he has laid a good, substantial foundation. Now, the best foundation for any nation is a good common-school education for the great mass of the people, and yet my misguided friends are doing all they can to turn their wealth and influence in favor of an education at the top at the expense of the bottom. Even admitting all that is claimed for the advantages of higher education, still I contend that the same money spent in educating the masses up to a higher standard would be of infinitely more benefit to the general public. We are never going to reform society from above downward; it must be done from below upward.

I know of nothing that people go into so blindly as educational enterprises. Many who show excellent judgment in other matters exhibit an incredible lack of it when anything of this nature is presented to them.

They take the greatest pains to inquire into the work of other public institutions which they are asked to support, but no matter what sort of an educational scheme is brought to them, they seem to take it for granted that it possesses merit, and are ready to aid it without question. When a person of high standing contributes to the support of such enterprises, it is evidence that he endorses them. In so doing, he assumes great responsibility, and therefore it is of the utmost importance that he satisfy himself beyond doubt that he is making no mistake.

CHAPTER VIII.

PROFESSIONAL MEN.

Having proved my principal proposition in the preceding pages, I will now ask the reader's attention to a consideration of the question whether a college education is of any value to the large numbers of young men who afterward take up some professional line of work.

Of the total number of college graduates (about eight hundred) regarding whom I have obtained any information as to their occupation, over seventy per cent are in professional or technical work, as follows:

Lawyers	*248*
Teachers	*117*
Doctors	*53*
Ministers	*35*
Technical	*118*
	571

Would it not have been much better for these young men if, instead of attending the regular college, they had gone to some of the special schools that are established for the particular purpose of educating people in these lines?

Lawyers.

It has been brought out incidentally in this investigation that more than twenty-five per cent of college graduates go into law. These added to the already

overcrowded field make it more and more difficult for an honest lawyer to earn a decent living. Thus the temptation to be unscrupulous becomes almost irresistible, and the result is a hundredfold more injurious to the community than the higher education can be beneficial.

A reputable lawyer has stated to me that, in his opinion, the average yearly income of country lawyers is not over $600, and of city lawyers $1,200. This would be an objectionable state of things, even if honor and education always went together; but, unfortunately, educated men are quite as likely to use their education for evil purposes as those who are uneducated, and this is particularly true of lawyers and public speakers.

It is only necessary to go into our courts of so-called justice almost any day in the week in order to see how lawyers use the education they have received to assist them in defeating the ends of justice and in robbing people of their rights and money. In like manner a well-educated speaker is often able to overthrow the arguments and thwart all the efforts of a less brilliant man who is advocating a noble cause. If a little learning is a dangerous thing, how much worse is a great deal of learning in unscrupulous hands.

I fail to see, therefore, why the people who support colleges should feel that they are doing any good by furnishing the facilities for producing so many lawyers. For myself, I should as soon think of putting money into a scheme for spreading smallpox as into any institution for turning out lawyers, for they are the great curse of our country to-day. Even the educators, some of them, have begun to wake up to the suspicion that they have been making a big mistake

somewhere, and I have seen it admitted in some of their public addresses that it has been a great waste for college work to produce such a quantity of lawyers and doctors for whom there is no demand or necessity.

The amount of education that people should be taxed to support is simply what is required to make them good citizens and also to make them self-supporting, and the kind that will tend indirectly to benefiting the public. It ought not to be pursued beyond what it is perfectly clear the public will derive results from.

I do not think this country is suffering from the want of scientific men, so there is no occasion to encourage education at public expense on that ground. Then, we certainly should not be taxed for turning out common doctors, as we already have too many of these.

Nor are we suffering for the want of any other professional men, so far as I know.

It is particularly an outrage on the public to be compelled to support the incompetent persons that are turned out by these higher educational institutions, such as the unnecessary doctors and the rascally lawyers that come from these schools.

In other words, it is an outrage for people to be compelled to support these institutions and afterward to support the imbeciles, sharks and dead-beats that they turn out.

CHAPTER IX.

COLLEGE EDUCATION AND CHARACTER BUILDING.

Since the second printing of this first part of my investigations on education, I have observed in my talks with college advocates that they apparently have abandoned the idea that college-educated men have any especial merit in business. Perhaps it is for this reason they are falling back on what might be called their "side shows."

Furthermore, as we now hear little talk about the "mental drill" given by a college course, we may conclude that this also is an exploded idea which soon may have the company of that other claim that the college is a great place for the development and improvement of character.

Doubtless, the less the college men say on this latter point the better for them; for I know of none of the absurd claims made by the colleges that is more difficult to prove than this. In fact, the opposite proposition — that college life actually does irreparable injury to character — may be established much more readily.

In this claim to character building the college champions seem to think they are behind a stone wall which can not be battered down, as it appears to be difficult to furnish proof to refute their statements. But it appears to me that it is incumbent upon them to offer some substantial evidence to justify this expenditure

for higher education; that is, they ought to be able and eager to show that they have produced many men of substantial character, who are doing good in the world.

But even suppose we admit that colleges build up character, what does it amount to commercially? Is there any truth in the claim that the young man's business chances are thereby improved? I know of no evidence that college graduates are in demand because of their superior character, and no one has ventured to make such a claim.

Have Collegians Superior Character?

If it be a fact that collegians possess superior character, it seems to me that one of two things must be true — either business men can not see that they have it, or men of character are not in demand for business.

What does it profit a young man to find that his expensive education has only furnished something which is of no help to him when he comes to seek a business position?

Surely it is a great waste to invest in so much character if there is no market for it.

How discouraging it must be for the college graduate to be obliged to pose as a monument of education, with such superior character and such superior knowledge, when those upon whom he must depend for employment tell him that, although he may have education and character, and be a brilliant ornament and benefit to society, they have no use for him in business.

It is asking too much of a poor young man to sacrifice so much time and get no return for his investment.

Perhaps college advocates may say that business men now do not want men of character, and infer that

they prefer a different class of men; but it will not do to assume that such is the case generally. Many business men have positions in which persons of good character are valuable, even though the possessors of such character may not have much business ability.

It should be plain that if the colleges expect to work along this line of producing men of character, they should point out to the students the grandeur of this class of men, and impress upon them in every possible way that they ought to have high aims in life and that, while men of character may not be very great money-makers, they are the class of people who are highly respectable and probably get more comfort and enjoyment out of life than unscrupulous money-makers who have acquired large fortunes.

What Students Should Be Warned Against.

They also should warn the students against men who have attained great success, financially or socially, through dishonest or improper methods, and show that such people are really not respectable and have no standing in the community.

Of course, there is nothing about the conducting of a college that is especially aimed at improving character, and there is nothing for this claim to stand upon except the idea that people who have education must necessarily have character. There is no pretension of any course of study or instruction to convince the student that "honesty is the best policy" and that it pays to have character.

Now, my theory is that character depends upon two things. First, it is a question of "blood," that is to say, of heredity. Secondly, it is the result of good training, especially in the home. Young men have to

be made to see that character is a real substantial asset in a man's life. It undoubtedly can be developed, but this requires persistent, systematic and judicious training.

Let us see what the probability is of character being improved or injured by this change in a young man's life from near-home influences to those of the college. Before going to college it is presumed that he lived at home, where he was under the anxious and constant care of his parents, and perhaps also of sisters and brothers, who have the greatest interest in him and who did everything they could to keep him in the right path.

The Indifference of the College.

He leaves all this and goes to college, where he is thrown absolutely upon his own resources. The college practically says to him:

"Here you are, a man, and old enough to realize that you have to stand upon your own feet. If you are disposed to go to the bad, it is entirely your own affair."

What must be the natural and necessary consequence when several thousands of young men are brought together at the most restless and indiscreet period of life, many of them with too much money and spare time at their command, and suddenly freed from all the restraining and guiding influences of home?

The public is too familiar with the result — hazing, painful and humiliating initiations, scrapes, and deviltry of various kinds, all done under the pretext of "fun." That is what the people of college towns well know may be expected frequently from these young "gentlemen" who are acquiring such a high moral character at a large expense.

A youth at college has so much leisure time on his hands, and associates with so many wild boys, that he is very likely to get into bad habits. On the other hand, the boy who goes to work, finds that there is no time for deviltry in an office or store. There is nothing so demoralizing as idleness, and nothing so tends to keep a young man out of deviltry as work.

Under such conditions, and in view of the fact that there is no specific attempt made by the colleges to teach morals, it does not require a great stretch of the imagination to see that the young man is likely to leave college with much less character than when he entered.

Many college students, even though they have character, do not seem to be disposed to make good use of it. They hold themselves superior to other people, and do not want to contaminate themselves by associating with others whom they consider to be "out of their class."

Danger of Exclusiveness.

President Hadley, of Yale, in one of his annual reports, commented on the dangers of this social exclusiveness among the rich students, who shun the university dormitories and live together in outside buildings.

A few years ago, the University Club of New York erected a new clubhouse, which, it seems to me, was the most extravagant and unjustifiable expenditure of money that I ever saw. While I do not know what the young men do in this club, I have not the slightest idea that they study economics or what can be done for the benefit of mankind. But I am inclined to think they do there the same as people do in all other clubs; that is, their only idea is to have a good time.

But I do know that no body of men, however great their character may be, can ever make that character a public benefit if they separate themselves by luxury and exclusiveness from their fellow men.

Many young men who have gone to college seem to be inclined to be snobbish, and to look upon the industrious masses with contempt. They prefer to live off the hard earnings of their parents instead of going to work. In all this it seems to me they show an utter lack of character.

Even in its general sense it is an open question whether education can be credited seriously with character building. It is a historical fact that the uncivilized races appear to have better characters than the civilized. Instances of this are numerous, both in the past and the present.

Cortez, when he invaded Mexico, and Pizarro, when he took possession of Peru, found a race of people whose character was far superior to the Spanish, notwithstanding that the latter was the most highly educated nation at that time. The strangers were received with honor, hospitality and childlike confidence, which the invaders repaid with perfidy and outrage.

The people whom Captain Cook discovered in the Sandwich Islands appear to have been far better morally than himself and the men who accompanied him.

A Comparison with Savages.

In this country, the Indians were more honest and truthful, and had higher qualities of character, than many of our forefathers. It is easy to believe that a great many of the earlier white traders had no character to speak of in comparison with the aborigines. The best evidence that the Indians of those days were hon-

orable and upright is the fact that William Penn, who paid them for their lands and treated them fairly, had no trouble with them; it was only people who ill-treated them that got into difficulty.

Mr. Martin Ryerson, of Chicago, who had a large amount of experience with Indians in the early days, felt that they were men of superior character. This was impressed upon him so strongly, that he erected an expensive monument to their memory in Lincoln Park.

Let us contrast these primitive peoples with a conspicuous class of college students and college graduates that is supposed to represent modern civilization.

It was my good fortune to know all of the prominent men of Chicago back in the fifties, and many of them I knew well. I recall all of them as men of integrity and of the highest type of character. I happen to have seen how not a few of the sons of these men, who had been sent to college, turned out in later years. It taxes my memory to find any considerable number of these young men who have shown either the ability or the sterling character of their parents in their business careers.

Why Do Students Degenerate?

In an address given before the National Education Association at Denver in July of this year (1909), Dean Fordyce, of the University of Nebraska, asked: "Why is it that a young man degenerates within six months after he enters college?" The Lincoln, Nebraska, *News,* commenting on this significant question, says: "Lincoln is a college town and it ought to know the answer." It probably does; so does Ann Arbor, and

Boston, and Madison, and Montreal, and New Haven, and other college towns.

The Dean's own answer was this: "They have been going to a secondary school under a home influence. They come to college as their own masters and in a few months they fall under the alluring vices constantly flaunted before their eyes."

Let New Haven tell us what some of these vices are. In the daily papers of July 8, 1909, there was a despatch bearing the New Haven date line in which a local minister made the assertion that "over two thousand disreputable women are living in New Haven."

Some years ago I employed a detective to investigate the conduct of the students at Harvard. The details of this investigation are too disgusting to be published in this book, but they showed conditions equally as bad as those attributed above to New Haven.

In view of the foregoing, I think that any one who would dare to pretend that the colleges have a tendency to build up character would be putting a low estimate upon the intelligence of the public.

That my views on this subject of character and education are borne out by the observations of other men who have gone deeply into it, may be seen in this quotation from Herbert Spencer:

Herbert Spencer's Opinion.

"Education, regarded as a panacea for political and social life, is a universal delusion, and the fact should be made sufficiently clear by a survey of your daily newspapers. The current theory is that if the young are taught what is right, and the reasons why it is right, they will do what is right when they grow up. But considering what religious teachers have been

doing these two thousand years, it seems to me that all history is against the conclusion."

The colleges do not mold or develop or encourage the molding or development of character; but that they should do so is the opinion of many leading educators. It was at a convention of the National Education Association, held in Boston some years ago, that Presidents Harris of Amherst, Tucker of Dartmouth, Slocum of Colorado, and Bishop Galler of Tennessee, expressed the same opinion to the effect that the colleges must concern themselves with the moral education of their students.

That his moral education is in no way connected with an academic education is abundantly evident from the opinion of Spencer, the conditions of college life given here and the arguments I have advanced against the absurd claim that the colleges do encourage the formation of good character.

It must be evident that everything depends upon the nature of the man who receives the education. If he is bad, education simply places in his hands a greater power for the working of evil.

Character that Football Builds.

Character is developed through struggle and encouraged by example. There is not much of struggle in modern college life, except that of the football field, and any one who considers this a fit place for the development of good character must have a mental vision sadly out of focus.

Compared with modern college football the Spanish bull-fight is a fair and wholesome sport. Theoretically, football is played with eleven men against

eleven; practically, it is often eleven against one — and that one down. There is nothing generous in the game. Brute force rules every play, and the cowardliness of uneven numbers and unmatched weights is characteristic of every gridiron contest. How can any human person, any lover of fair play, take enjoyment out of watching a game in which a dozen or more husky brutes pile themselves in a heap, kicking and tearing at one another like cats and dogs, and crushing the life out of some poor fellow who chances to be underneath? Manly sport, isn't it, that sends boys from the field maimed by the weight of unfair numbers, broken by the kicks of heavy boots, far too often fatally crushed; and all for the glory of alma mater! Heaven save the mark!

It is estimated that about twenty-five or thirty persons have been fatally injured this year in the game of football, but as this happened in the name of "education," no one is punished for it. The public appears to look upon it as being all right and an evidence of culture, character and civilization.

If a man is killed intentionally in any other way, some one either is hung or goes to the penitentiary for the crime; but when murder is committed in this brutal game, the murderer not only goes unpunished, but is lionized by the admirers of the sport.

When the little son of Rev. John H. Barrows was in a delirium just before his death from injuries received in a football game, he was heard to say: "It was a shame for that big boy to kick me so." What sort of a man will the boy become who caused the death of this little fellow? What an example is this of the results that come from the encouragement of this game and of giving to young boys the impression

that it is manly and proper to kill those smaller than themselves.

The character developed by college football is the character of the brute, the character of the coward, the character of everything that is what a man and a gentleman can not be. And those who encourage this "sport" encourage brutality and cowardice of the lowest sort known to humanity.

I take it that the prime requisites of good character are truthfulness and honesty. The tendencies opposed to these destroy character.

Character Tested by Deeds.

I claim that education has not had the effect of giving the general run of college presidents and advocates character of this sort. It is clear to me that these persons are not honest or truthful, and that they are making a systematic business of deceiving the public and their students. They are continually putting the importance of a college education before the public in an unjustifiable manner. Therefore, if these persons have not character themselves, they can not be good teachers for young men who wish to have their characters improved.

The universities have been doing much in the way of seeking large numbers of students without being particular as to their qualifications. They are not at all particular who they take in, so long as they can get the numbers.

We sometimes hear these educators speak of the "tricks of trade" that those who are educated would not stoop to practice.

I believe I have shown that they are not lacking themselves in "tricks of trade," so long as they con-

tinue to present the college as an unusually good place for the molding and development of character.

The Verdict of Dr. Virchow.

(Extract from "The Curse of Education," by Harold Gorst, an English observer and writer.)

At the Berlin conference on secondary education, held in 1890, Dr. Virchow observed:

"I regret that I can not bear my testimony to our having made progress in forming the character of pupils in our schools. When I look back over the forty years during which I have been professor and examiner — a period during which I have been brought in contact not only with physicians and scientific investigators, but also with many other types of men — I can not say that I have the impression that we have made material advances in training up men with strength of character. On the contrary, I fear that we are on the downward path. The number of 'characters' becomes smaller. And this is connected with the shrinkage in private and individual work during a lad's school life. For it is only by means of independent work that the pupil learns to hold his own against external difficulties, and to find in his own strength, in his own nature, in his own being, the means of resisting such difficulties and of prevailing over them."

Character in the Medical Profession.

This question of character is one on which there is considerable difference of opinion, and it is difficult to obtain absolutely clear evidence on either side.

Recently, however, I came across a case that goes a long way toward proving that the educated and cultured class are fully as lacking in character as the most unscrupulous among the uneducated. I refer here to the Rush Medical College, of Chicago, and the Chicago Medical College. Both of these institutions at one time had on their faculties nearly all of the

most prominent physicians in Chicago, and yet they made a practice of accepting as students young men who had very little general education to begin with, and, after a two years' course, turned them loose on the public as full-fledged doctors.

Can anyone imagine a more contemptible, grasping, money-making enterprise than that? I do not believe there can be found anywhere a business man so unscrupulous that he would resort to such despicable practice as that.

I look upon a man who knocks another down and robs him of his money as a high-grade thief in comparison with the dishonest doctors that are conducting these medical schools. Doubtless it is not a small thing to deprive a person of his money, but to turn out doctors that do not possess one-quarter the amount of medical education they ought to have, and to furnish them with certificates permitting them to tamper with the health of a human being is, in my opinion, infinitely worse. After such a startling exhibit as this, what becomes of the theory that higher schooling tends to produce character?

I greatly regret being compelled to make such unpleasant statements concerning the doctors connected with these medical colleges, for many of them were my particular friends, whom I associated with for years and I became greatly attached to them. In such an important matter as this, however, I feel that the public is entitled to all the facts.

CHAPTER X.

THE MAKING OF STATESMEN AND ORATORS.

It is evident that those who laid the foundations for this republic considered it essential to the perpetuation of our institutions and form of government that schools should be established for the education of statesmen and the better equipment of orators. But when we look at the first century of our history, and pick out the really great and strong men who took prominent part in public affairs, we are struck by the fact that the majority of them received little or none of such higher education as the country then provided, and some of them did not have the advantages even of the very limited public education of those earlier days.

It is not necessary to travel over the whole country to establish this point; so I shall take only one State — Illinois — as an illustration of what has been done in the way of producing notable statesmen and orators without the help of higher schooling, and at a time when free public schools had not become a statewide institution.

The Act of Congress, which enabled Illinois to prepare for statehood, provided that section sixteen of every township should be "for the use of schools." There also were provisions for the establishment of a State university and a seminary. In 1825, Senator

Joseph Duncan's Free-school Act was passed, providing for local and State taxation. There was considerable protest against this law, especially among the farmers, the contention being that these schools would take the boys away from the farm. To meet these objections, the Legislature of 1827 amended the Duncan Act, so that no person should be taxed for school purposes without consent, but that persons residing in the limits of a school district should have the privilege of subscribing for the support and establishment of the school, and the rents and profits of any school lands within the boundaries of the township were to be assigned and appropriated for the use of the school under the superintendence of trustees.

Early Education in Illinois.

It was not until 1854 that the office of State Superintendent of Schools was established, and with it a complete system of free public schools. And it remained for the constitution of 1870 to "provide a thorough and efficient system of free schools, whereby all children of this State may receive a good common-school education."

From these facts it must be evident that during the most important formative period of the State of Illinois the people had no definite free-school system and nothing worth mentioning in the way of higher schooling. Yet, it was just this period that gave to the State and to the nation a notable array of some of the strongest statesmen and orators that this country has known.

I am aware that not all of these were born sons of Illinois, but with few exceptions their school advantages were not superior to those offered by this State

during the time they developed into leading and dominant public figures. We must consider these men, as a whole, far superior in all that constitutes true statesmanship to those who came after and who had much larger opportunities for securing both public and higher school education.

How Much Schooling is Enough.

Another interesting point arises in connection with this glimpse at the earlier educational history of Illinois, and that is: how much schooling may be considered enough for a person's good?

There always will be a wide difference of opinion on this question, ranging all the way from those who believe no schooling at all to be best, to those who believe one can not have too much.

In the former class we still have many of our farmers, which must be evidenced from the present low order of country public schools. The Illinois farmers of 1825, who believed that the very smallest amount of education tended to take boys from the farms and to unfit them for farming, would find company among the farmers to-day. For it is an indisputable fact that schools draw the farm lad to the village, thence to the town, thence to the city, each move in search of schooling taking him farther and farther from the farm.

Really this educational problem places the farmer between the devil and the deep sea. It is necessary that every boy in the land be given enough education to enable him to exercise the franchise intelligently, that he may be a good and useful citizen. But if even this reasonable amount of education draws boys from the farm, how far may we go in censuring the farmers

if, in sheer self-defense, they show an unfriendly front even to efforts to bring the district schools somewhat nearer to what they should be?

In view of this condition I can not see how the higher educators can hope to secure the support of the farmers even for agricultural education, for this would be asking them to encourage a course that draws their boys from the farm, and unfits them not only for the life and work of the farm, but for all other forms of industry.

CHAPTER XI.

SOME VIEWS OF OTHER INVESTIGATORS.

"At the mouth of two witnesses, or at the mouth of three witnesses, shall the thing be established." I present here the testimony of several witnesses, men who have investigated this question of higher schooling and have reached conclusions on a number of essential points practically the same as my own.

"THE DISADVANTAGES OF EDUCATION."

(Excerpts from an article in "The Nineteenth Century," giving a study of the results of special and advanced education in England.)

While educational enthusiasts in and out of politics are strenuously advocating the "training" of leaders of men in every field of human activity, it is useful to consider occasionally the limitations of education, and to remember how few of the leaders of men have been "trained" to their leadership by third parties, either in schools or otherwise.

It is an old experience that the most prominent men in nearly every province of human activity have been amateurs, and that is one of the reasons why amateurs and not professionals are selected to rule our great public departments. Our great administrators have nearly all been amateurs and autodidacts. To take a few of the best-known examples: Cromwell was a farmer, Warren Hastings and Clive were clerks, Mr. Chamberlain was brought up for trade, Lord Goschen for commerce, and Lord Cromer for the army. Other countries have had the same experience with self-taught amateurs. Prince

Bismarck was brought up for law, failed twice to pass his examination, became a country squire, and drifted without any training into the Prussian diplomatic service and the cabinet, and founded the German Empire. George Washington was a surveyor, Benjamin Franklin a printer, Abraham Lincoln a lumberman, M. de Witte a railway official.

In a less exalted sphere we meet with the same phenomenon. Sir William Herschell was a musician, Faraday a bookbinder, Scott a lawyer's clerk, Ney a notary's clerk, Arkwright, the inventor of the spinning-machine and the first cotton manufacturer, a barber, Spinoza a glass-blower, Edison a newsvender; George Stephenson and most of the great inventors and creators of industry of his time were ordinary workingmen.

When we look around we find not only that many leaders of men were devoid of a highly specialized training in that particular branch of human activity in which they excel, that they were self-taught amateurs, but that many of the ablest politicians and of the most successful business men have not even had the advantage of a fair general education. Abraham Lincoln had learned at school only the three R's, and those very incompletely, President Garfield worked with a boatman when only ten years old, President Jackson was a saddler and never spelled correctly, President Benjamin Harrison started life as a farmer, and President Andrew Johnson, a former tailor, visited no school, and learned reading only from his wife. George Peabody started work when only eleven years old, the late Sir Edwin Harland was apprenticed at the age of fifteen years, Andrew Carnegie began his commercial career when twelve years old as a factory hand, Charles Schwab, former president of the United States Steel Corporation, drove a coach as a boy, and then became a stake-driver at an iron works. Josiah Wedgwood started work when only eleven years old; Arkwright, the father of our cotton industry, was never at school; Edison was engaged in selling papers when twelve years of age, and Sir Hiram Maxim was with a carriage builder when he was fourteen. "Commodore" Cornelius Vanderbilt, the railway king, who left more

than a hundred million dollars, started as a ferryman at a tender age; the founder of the wealth of the Astors was a butcher's boy, Baron Amsel Mayer von Rothschild a peddler, Alfred Krupp a smith, Rockefeller, the head of the Standard Oil Trust, a clerk. All these most successful men were autodidacts. People well acquainted with the city can name a goodly number of millionaires who occasionally drop an "h," the only evidence left of an arduous career from the bottom rung of the ladder.

Why have so few eminently successful men been school-trained? Because the acceptance of ready-made opinions kills the original thinking power and unbiased resourcefulness of the mind, and paramount success can not be achieved by docile scholars and imitators, but only by pioneers. Besides, the independent spirits who are predestined for future greatness are usually impatient of the restraint of schools, and of their formal and largely unpractical tuition, and wish to be free to follow their own instincts toward success.

In view of these numerous well-known instances of greatness achieved by men unaided, but also unspoiled by education, who taught themselves what they found necessary to learn, which instances might be multiplied *ad infinitum,* it is only natural to find a strong opposition to education among the unlearned men whose native shrewd common sense has not been affected by the reading of books. But even the learned begin to waver and to ask themselves whether the much-vaunted benefits of learning have not been largely overestimated, and whether the undoubted advantages of education are not more than counterbalanced by corresponding disadvantages.

The doubts as to the advantages of education have been considerably strengthened by our experiences in the South African War. Many observers have been struck by the curious phenomenon that our most highly educated officers had on the whole so little success against the Boer officers, who were not only quite unlearned in the science of war, but also mostly uneducated, and sometimes grossly ignorant in elementary knowledge, peasants who had perhaps not even heard the names of Frederick

the Great, Napoleon and Moltke, whose every battle our erudite officers had at their fingers' ends.

The highest military school in Great Britain is the Staff College. The officers who have succeeded in passing through that institution are considered to be the most intellectual, and are marked out for future employment in the most responsible positions. They are our most scientific soldiers and represent the flower of learning in the army. Consequently it might be expected that our most distinguished generals should be Staff College men. However, if we look through the Army List, it appears that our most successful officers in the Boer War — Lord Roberts, Lord Kitchener, Sir John French, Sir George White, Sir Archibald Hunter, Sir Ian Hamilton, Lord Dundonald, Sir Hector Macdonald and General Baden-Powell — have not passed the Staff College. On the other hand, we find that the late General Colley, who lost Majuba, was a prominent military scientist and Staff College professor, and that General Gatacre, who was defeated at Stormberg, and Generals Kelly-Kenny, Hildyard, Hart and Barton, who also took part in the South African War, though not with conspicuous success, have the much-coveted P. S. C. (passed Staff College) printed before their names. In the South African War it came to pass, as some crusty old colonels had prophesied, that the officers who were brimful of scientific military knowledge, and who could talk so learnedly on strategy and tactics, achieved nothing on the field of battle. Those who achieved something had not been "trained" to generalship in the Staff College, and had not had their natural thinking power, their common sense, crowded out of existence by the absorption of a huge store of book-learning.

After some of our initial defeats a distinguished general was sent out, and it was reported that wherever he went a large library of military works, strategetical, tactical and historical, went with him. He and his library went to Africa to save the situation, but not many months after that distinguished scientific general returned in disgrace to England, together with his library. His imposing book knowledge, with which he could talk down any mere fighting officer, had availed him nothing in the field.

Our "highly-trained" professional intelligence officers proved also of very little value until they had unlearned in Africa what they had been taught at home, while quite unlearned Transvaal peasants made splendid intelligence officers. On the other hand, "Colonel" Wools-Sampson, by far our best intelligence officer, was a civilian.

Our politicians have unfortunately not yet learned the lessons of the South African War. Instead of investigating why the unlearned peasant officers defeated so often the flower of our military scientists, who were fortified with the most profound military education, and who had a most extensive knowledge of the battles, the strategy and tactics of all periods, from the time of Hannibal onward, a committee of gentlemen innocent of war was deputed to inquire into the education of our officers. Naturally enough their verdict was condemnatory of the present system, and various suggestions were made by it how to improve the education of our officers. Lord Kitchener, General French, Christian de Wet and Louis Botha, fighting officers who are no doubt the most competent judges of the qualifications required in an officer for war, were, unfortunately, not asked for their opinion on such a vital matter. It would have been interesting to learn how much or how little weight practical authorities of unrivaled weight, such as these, attach to school education of officers as practiced in Great Britain, and what, according to their opinion, the effect of that school education is upon their common sense.

In view of these few examples, which are universally known, and many more which are less familiar, it is not to be wondered at that thoughtful men begin to question the efficacy of education altogether. * * *

No doubt, the object of education should be to enlighten the understanding, cultivate the taste, correct the temper, form the manners and habits of youth, and, especially, to fit them for usefulness in their future stations by preparing them for the battles of life. Is this object attained to any degree by our present education, or does it chiefly endow us with a show of motley knowledge, mostly useless in after life, to the detriment of our natural thinking powers and of our common sense?

The danger inherent to the possession of a store of undigested knowledge is that it shackles, stifles and often kills the free working of the brain. That great danger of education has been clear to many great men, from Solomon onward, who have given the matter a thought. Of the numerous epigrams which have been coined to warn against the danger of substituting a dead weight of undigested and therefore useless knowledge for an active, unprejudiced and clear brain, endowed with common sense, I should like to mention only two: Goethe's, "The greater the knowledge the greater the doubt," and Hazlitt's, "The most learned are often the most narrow-minded men." The truth of these sayings is absolutely clear to everyone; only this truth, though instinctively felt, has not sufficiently been taken to heart by those who direct the education of the nation.

It has been truly said "knowledge is power," but knowledge in itself is not power, only *applied* knowledge is power. *Knowledge is like money,* not valuable in itself, *but only valuable for what it will buy.* Knowledge is like a strong weapon, but the best weapon is useless to a man who does not know how to wield it. Knowledge is an elementary power, but the power of the Niagara, or of steam, or of electricity, would be useless to mankind unless intelligence directs that power to some practical purpose. The Chinese knew magnetic iron long before the Europeans knew it. To them it was a piece of iron and nothing more. Handled by European intelligence, magnetic iron became a useful power in the compass, which gave Europe the rule of the seas. The Chinese knew also gunpowder before the Europeans knew it, but to them it was only a plaything used in fireworks.

A learned officer whose intelligence has been swallowed up by his military studies will not immediately fit his tactics to the case in point, as his free common sense would suggest, but tries often to make the case in point fit the theories which he has imbibed, or the historical precedents and parallels which his memory, not his judgment, suggests to him. An example: On the 15th of December, 1899, General Buller telegraphed to Lord Lansdowne from Chieveley Camp:

"* * * My view is that I ought to let Ladysmith go and keep good position for the defense of South Natal, and let time help us. * * * The best thing I can suggest is that I should keep defensive position and fight it out in a country better suited to our tactics."

Instead of looking at the position of the enemy and his tactics with an unbiased mind, and fitting his tactics to the ground and circumstances, General Buller evidently wished to fit the ground and circumstances to his unsuitable book tactics and proposed to retire to South Natal in the vain hope that the enemy would oblige him by following after, and thus enable him to fight there according to the book. Other generals complained that the Boers "bolted" before an attack with the bayonet could be "brought home." They seemed to consider that the Boers did not play the game squarely in deviating from the tactics taught in the text-books. * * *

What applies to military matters and to business of state applies with equal force to trade and commerce. None of our successful generals in the South African War have passed through the Staff College, and no business man of the first rank in Great Britain, America or Germany has, as far as is known, come from commercial high schools. On the contrary, it seems that Mr. Carnegie's advice to "start young and broom in hand" is most excellent counsel. While great fortunes and great industries have almost invariably been created by uneducated men, parvenus unembarrassed with learning, who taught themselves what they found necessary to know, we find on the other hand that those men who have made commercial science, political economy, their study, have not shown any success in business and have remained theorists. Most political economists have had to live on their pen. Mr. Cobden went bankrupt in business. It is true that Ricardo was well off, but he was a stockbroker by trade, and with him political economy was only a hobby, not a serious pursuit. It is strange how few business men of the first rank have a good word to say of political economy. * * *

As the possession of knowledge without understanding is not only useless, but as its acquisition also deprives

the learners of much valuable time which might more advantageously have been employed in a different way, it is quite clear that the schools should first of all try to develop the native intelligence, the common sense, of their pupils, instead of ignoring its presence and weakening its force. Furthermore, schoolmasters should constantly bear in mind that knowledge can only be usefully acquired in proportion to the common sense possessed by the learner, that learning must be subordinate to understanding, and that, though common sense can make excellent use of knowledge, knowledge can never replace common sense. Tuition should, therefore, always look to the intellectual power of the scholar, as the engineer looks to the pressure-gauge, and regulate accordingly the rate of progress in learning, instead of mechanically filling the learner's brain to the full capacity of the memory, and thereby crowding out the common sense. * * *

Dr. Woodrow Wilson's Opinion.

(From an address by President Woodrow Wilson, of Princeton, delivered at the Washington University, of St. Louis.)

"The most serious task before the university world to-day," said President Wilson, "is the task of restoring the balance in favor of the intellectual interests of our colleges and universities. A strong university has no need of being advertised by its teams, its glee-clubs or its dramatic societies. Moreover, the many undergraduate activities, each in itself innocent, are in the aggregate exhaustive of the supply of energy and initiative which each student possesses. Too often, after football and baseball and fraternity dances, comes study; and the professor receives not the close attention and undiminished initiative which he has a right to expect, but that tiny residuum which is left over after the pleasures of college life have had their sway.

"A man who takes a course of four years of social life at some university," declared President Wilson, "has thrown away four years of that natural power to work

which descended to him from his great progenitor, Adam. He now finds himself face to face with actual work in its true sense, and he also finds that he is not ready to work; his faculties are undeveloped, his fund of information is limited and very hazy; he is a college man, but he is not a trained man, nor an educated man. It is a singular fact that our universities are standing upside down, not on their heads — which might be not altogether a bad thing — but on the wrong end. Pleasure is business, and business is pleasure. As a matter of fact, a man's chief duty to himself and to society is to get his brain into such shape that he can use it, and certainly one function of a university is to show the applicant whether or not he has any brains. Men are too ready to assume that they can be educated, that they have brains."

Progress and Character.

(Extract from an article by Mr. Chamberlain, formerly premier of Great Britain and a prominent manufacturer.)

"I would remind you that all history shows that progress — national progress of every kind — depends upon certain individuals rather than upon the mass. Whether you take religion, or literature, or political government, or art, or commerce, the new ideas, the great steps, have been made by individuals of superior quality and genius, who have, as it were, dragged the mass of the nation up one step to a higher level. So it must be in regard to material progress. The position of the nation to-day is due to the efforts of men like Watt and Arkwright, or, in our own time, to the Armstrongs, the Whitworths, the Kelvins and the Siemenses. These are the men who, by their discoveries, by their remarkable genius, have produced the ideas upon which others have acted and which have permeated the whole mass of the nation and affected the whole of its proceedings. Therefore, what we have to do, and this is our special task and object, is to produce more of these great men."

Mr. Chamberlain mentions only a few of the great men of England who, without special education — and

not much of general education — attained fame for themselves and laid the foundation for England's wonderful material progress. He might have named Stephenson, Dudley, Brasse, Napier, Nasmyth, Russell, Koenig, Bramah, Maudslay, Clement, Fox, Whitworth, Fairbairn, Smeaton, Kelley, Rennie, and a score of others.

And I might add that in this country we have had in the same class, as the real builders of America, such men as Slater, Fulton, Ericsson, Blanchard, Read, Howe, Corliss, Baldwin, Goodyear, and many others.

Not all of our higher educational institutions combined can present an array of names and achievements to compare for a moment with those I have just mentioned. Nor can they show conclusively that they have played a part of any importance in contributing to the success of the country.

CHAPTER XII.

CONCLUSION.

I am perfectly well aware I shall receive neither the thanks nor the sympathy of the college clique for this investigation, for the so-called higher education is the fashionable thing and it is "bad form" to say anything against it. Many people of prominence, in their interviews or articles on this subject during the past year, have, through ignorance or enthusiasm, made exceedingly foolish and absolutely untruthful statements in behalf of educational institutions, and it is just such remarks, together with the absurd notoriety given to the various athletic and other contests of college clubs and societies, that are largely responsible for the false ideas prevailing among a large portion of the public in regard to the value of a college education.

My great object in this investigation has been to furnish facts instead of theories, in order that people may be able to determine whether they are justified in making the great sacrifices that are required to send their boys to college. This is a work that should have been undertaken long ago by the college authorities themselves, for it is their duty to the public to see that no deception is allowed to exist on this subject. But, even after I have furnished them with the evidence that has been produced by this investigation, I do not suppose for one moment that they will make it public or retract their statements. Instead of laying the facts

before the young men who are preparing to enter college, they will go right on deceiving as many as they can and taking the money of those to whom they can give nothing in return but useless knowledge. Practically they stand on the same level as the merchant who sells goods which he knows to be shoddy.

PART TWO

TECHNICAL AND SPECIAL SCHOOLING

INTRODUCTORY TO PART TWO.

One of the surprising things of the present age is the enormous development of technical schools in this country in the last forty years.

In 1870 there were only two technical colleges — the Troy and the Philadelphia Polytechnic. Now there are forty-five strictly technical schools, and in addition almost all the colleges have technical departments, making the number several hundred, with many thousand students.

In view of the indisputable fact that practically all of the great engineers that have ever lived had no technical-school training, and that all the wonderful progress that this country has made in the perfection of manufacturing has been accomplished without such training, is it not reasonable to ask if we have not gone crazy on this subject?

The object of Part Two of this book is to show the fallacy of these technical schools.

CHAPTER I.

TECHNICAL EDUCATION APPLIED TO MANUFACTURING.

There seems to be a belief in some quarters that technical education is valuable to manufacturing. I have given this matter much thought, and I wish to say that in my long experience in the manufacturing business I have seen no practical results coming from technically trained men, and I do not know of a case where a practical and successful manufacturer has taken any interest in technical schools.

Value of the Practical.

I lay strong emphasis on the practical side. The period of a boy's life usually given to technical education is the most important in his whole career, and should not be devoted to anything questionable or speculative. Technical schools are built, supported and managed wholly by impractical people, and they are not qualified to play a part in the training of boys who have to earn their own livelihood in a mechanical line.

I most emphatically disagree with the popular belief that a technical education is necessary to the production of good mechanics, foremen, superintendents, etc.

So far as manufacturing is concerned, I am most decidedly of the opinion that time spent in technical

schools is absolutely wasted. I as strongly believe that technical education is a positive drawback in nearly every mechanical line.

For example: I glance over a recent bulletin of one of our technical schools and see that the students will make "astronomical observations and computations to determine time, latitude and azimuth." That they will have advanced work in "differential and integral calculus, mechanical differentiation and integration, calculus of imaginaries and hyperbolic functions," and that "elliptical functions" will be defined. There also will be "addition and multiplication of determinants" and some exercise with the "ellipsoid," the "hyperboloid" and the "paraboloid."

Now these things may be all very well in their place, and very interesting to a few, but how in the name of common sense are they going to help a young man to be a good, all-around, practical mechanic?

Will knowledge regarding differential and integral calculus enable him to run a lathe or work at a vise?

Can a foreman do his work better if he be on intimate speaking terms with the azimuth?

Danger of Impractical Things.

Because a superintendent can roll ellipsoid or paraboloid as a sweet morsel under his tongue, is he the better fitted to select and to control his men?

Ordinary common sense gives a most emphatic NO to these questions.

The youth who gets a few of these things into his head, in some hit-or-miss fashion, may feel that he is securing knowledge essential to his progress, and con-

sequently he comes out of the technical school and goes into the shop with the idea that he is superior to the boy wholly shop-trained.

His head is swelled to such an extent that he is unable to grasp the practical things that *are* essential to his advancement and success.

In fact, if such a lad does succeed as a mechanic, it is because he has sense enough to profit by the knocking around he is sure to get in the shops, and to drop his false ideas, so that he may begin to learn things of real practical and material value to him.

I maintain that what is necessary for men to have to be successful in manufacturing is a thorough knowledge of the art, of the kind of machines best adapted to certain purposes, and of how much the machines are capable of producing. Also, what is a reasonable day's work in the different lines that the men are employed at. That is to say, a man should know just what a ton of various kinds of castings can be produced for. If he is building an engine he should know almost exactly the number of days' work it takes to turn it out.

These prime essentials are not found in a course in technology, but in long experience and close observation in the business, and in a thoroughly up-to-date factory.

Many are deceived in regard to the value of technical education by the fact that some of the graduates from technical schools get into good positions.

Undoubtedly this is true, but only to a very limited extent.

I maintain that where one technical graduate secures a good position, a dozen boys, who have had

none of this technical training, also get good positions, and fill them equally as well as, or better than, the technically educated young man.

Where Technical Schools Fail.

It would be most surprising if the technical schools did not turn out something above the average now and then, when we remember that as a rule none but the brighest boys are sent to such institutions. And this, to my mind, is one of the strongest counts against this class of higher education: it has its pick of the best and brighest, yet with such working capital it makes no adequate returns.

I know of one concern that tried twenty graduates of technical schools, and I am informed that of this number seventeen proved absolute failures, two were indifferently successful, and only one turned out to be a decided success.

These men were tried as salesmen, where they would be much more likely to succeed than in the management of mechanical operations.

As an argument, on the other hand, I know of one large manufacturing concern in this country that, despite the fact that it was surrounded by technically trained men, chose its superintendent from the ranks of its common laborers, giving him a position that paid $12,000 a year.

I might also cite the case of a man I know who took a course in architecture in the "Boston Tech.," and afterward admitted that before he could make any progress in his profession he had to forget about all that had been taught him in that school.

I don't know of a case where a technically educated man has built up a manufacturing business of his own

and carried it to marked success. In fact, it is rare to find instances where technically trained men have assisted materially in the building up and management of great industrial enterprises.

Why, then, do we hear such enthusiastic claims to-day for what technical-school education is doing?

Why such boasting about what Germany is doing in a technical way, till that country has become one of our bugaboos? As far as mechanics is concerned, we have nothing to fear from Germany; but it is undeniable that Germany has much to learn from us.

One or two facts will illustrate this. A year or two ago one of my sons, while in Germany, visited a large electrical plant in Nuremburg, and found that this factory not only was filled with American machinery, but was managed by Americans.

While talking with a gentleman, some time ago, concerning the manufacture of agricultural machinery in Germany, he made the statement that on a recent visit to that country he had seen a factory that was being fitted up for the manufacture of reapers and that was completely equipped with American machinery.

No Need to Fear Germany.

I am also told by a German who visited one of the prominent automobile factories in Germany that there also American machinery was used almost entirely. In talking with one of our prominent machine tool builders some ten years ago, he said that he was exporting fifty per cent of his output, and that another man in the same business in his neighborhood was exporting sixty per cent of his output.

I mention these facts because I hear so much talk

about the importance of the German technical schools to manufacturing, and that there is danger of the American manufacturer being completely outstripped unless he encourages these schools here. My theory is, however, that this course would ruin American business, instead of help it.

If Germany is so far ahead of us mechanically, why does she buy our machinery for her factories, and hire our mechanics?

Who ever heard of Americans buying extensively of German machinery or employing German mechanics as foremen and superintendents? If she is so great in this line as some would have us believe, shouldn't there be a great demand for her machinery and mechanics?

CHAPTER II.

TECHNICAL EDUCATION IN ENGINEERING.

Following a regular order in my investigation as to the practical merits of all kinds of higher or special education, I come now to technical schools that have to do with education in the various branches of engineering.

Before getting right into my subject I wish to give what I understand by the terms "expert" and "technical," as they will be used frequently in this article.

As the dictionary definitions of these terms are confusing, I shall consider them as follows, believing that this is the view people generally take regarding them:

An "expert" is one who has become skilled and thorough in any line of handicraft or calling.

A "technical" man is one who has learned the science or theory of some calling or handicraft.

How Technical Schools Have Grown.

The engineering schools seem to have been simply an outgrowth of the whole higher educational movement. Professors and teachers who appear to hold to the belief that they know just what the country needs, or who have become jealous of other colleges that have established engineering departments, have gone ahead adding to the list of these institutions without any knowledge as to whether there was any real need for them.

There seems to be a sort of fascination for many people about the word "engineer," especially if a man is a technical-school educated engineer, and still more so if he has received his technical-school instruction in Germany. Some apparently look upon such men as superior persons, in fact, in some cases, almost worshiping them.

The great mass of people who employ engineers have not the slightest conception of the subject, so it is only natural that when in need of an engineer they should select one who has the reputation of having been educated at a technical school, and especially one who may have been so educated in Germany.

Only those who have had a large amount of experience with engineers can discern their merits; so that it is readily understood how the technical-school engineers are likely to acquire their reputation, and thus many fall into the error of believing that technical-school graduates must be superior to those who have had only practical experience.

Holding this view, it is not surprising that there should be some who think that if one can not get good work from the engineers having technical-school education, where can it be procured?

If a man can become a success in engineering without attending a technical school that will teach him the theory of his profession — that is, if he can secure all the information he needs in the actual practice of his line — does it not prove that the school is of no necessity to him?

On the other hand, if a man goes to a technical school and afterward in the practice of engineering makes a success of it, surely it does not prove that the school was an important factor in his success.

In view of the fact that the world got along successfully before the existence of technical schools, and that all the important engineering problems were solved before that time, and to the further fact that these schools have not produced any engineers of greater ability than the engineers who were not technically educated in school, it would seem to be highly proper to raise the question whether we have not gone altogether too far in our rush to make technical-school engineers.

Where the Danger Lies.

The chief danger lies in the fact that the schools are likely to go to a great extreme in teaching theory—in other words, that they will take up much of the students' time unnecessarily.

Doubtless a reasonable amount of theory is all right, but the trouble is that too many engineers are turned out of the schools with nothing but theory, and I can not find anything to show that these have been any more successful anywhere, as a class, than have the engineers who received no technical-college education.

Technical-school education should be subjected to the same tests as any other sort of education. The primary object of schooling is to teach the things that ordinarily are hidden — that is, the things which can not be learned in the ordinary practice of any line of work. And when we seek for the things that practice can not, or does not, teach we are likely to find that there is very little left for the schools to do.

The ordinary person is likely to get confused regarding all sorts of schools of the technical kind,

by imagining that they are the fountainhead, the place where everything originates in connection with the lines they teach.

As a matter of fact, nothing originates in these schools, for it all has been originated by practical men.

The technical school, for example, is simply a storehouse for information that has been gathered from the practical workers of the world.

It must be obvious that none of the knowledge which the technical-school man possesses could have been secured through theory. Of necessity, this knowledge must have originated in practical experience and have been developed through practical processes.

To bring this point nearer home, I may be excused for making a personal reference:

When I was engaged in the steam-heating business, I arranged and perfected half a dozen or more novel meritorious systems of warming and ventilating, and planned the apparatus of quite a variety of unusual buildings — requiring the nicest calculation in getting the heating surface correct, and in every case it was absolutely correct.

In all of these I worked out all of the details which entered into every feature of the plans. These I had to determine from practical experience, and I do not hesitate to say that the various systems were perfect, not only in heating and ventilating, but in smoothness of operation and economy of construction.

Technical Schools Have Their Field.

Now, if these things had been copied and done by a technical-college educated man, which is the usual case, I do not doubt that he would have been looked upon as considerable of an engineer, almost a genius.

The way this matter is viewed generally, he would have been given credit for being a great engineer, while I, as a steamfitter and practical man who furnished all the brains, would have been without standing.

And what I have said in regard to my own case is as true of every feature of engineering work.

I admit that there is a legitimate, though limited, field for technical schools. If they would confine themselves with diligence and great discretion to accumulating the best practice of the best practical men, and preserve this information and experience, so that it might be handed down with discretion to the students, they might do considerable good.

But, as I understand it, these schools are open to the severest criticism, because their work is not done with discretion and the students are not instructed with judgment.

As I have been informed by a good engineer, the necessity for technical schools is not so much to stuff the minds of the students with a lot of rules and figures, as to have them become familiar in a general way with the subject and to know where certain and best information may be had when they want it.

To-day the student's mind is crammed with a great quantity of this information, an enormous amount of which is immaterial; and of that part of it which may be material to him, he probably will forget nine-tenths of it before the time comes when he may require it in practice.

And in no case would it be prudent for the practicing engineer to depend upon his memory for important rules and figures. The prudent man simply will go back to the authorities and there ascertain definitely

what the rules and figures are before he attempts to use them.

I may illustrate this indiscreet, if not useless, teaching of the schools by referring to a letter received from an engineer, a technical-school graduate, who said in one part of it: "During the past five seasons over $400,000 worth of work has been done under my charge; I can not say that there was a single instance which absolutely necessitated a technical-school education."

It is perfectly clear from this engineer's letter that, notwithstanding this admission of having received no benefit from these schools, he is a warm friend of technical-school education; so it can not be said that I have quoted one who is prejudiced against such instruction.

Small-salaried Professors.

Another point suggests itself in this connection: I think that in this country there is very little really good, substantial ability in the faculties of our technical schools, nor can we expect to get satisfactory results from instructors who receive not more than $3,000 or $4,000 a year.

An inconsistency here arises: If these professors are as capable of producing good engineers as they would have the public believe they are, they would not be occupying the positions they have, but would be secured by some of the great engineering establishments. But, in my judgment, no engineering establishment would give those fellows $2,000 a year, and it is perfectly absurd to imagine that such professors can make first-class engineers.

I understand that in Germany the technical schools

pay high salaries for instructors, professors and lecturers, picked from among the best of those who are actually engaged in engineering work, who are fully up-to-date, and who, consequently, are altogether the best qualified to teach others their profession.

It seems almost impossible to get reliable information on this subject from either class of engineers, technical or practical, because each seems to be prejudiced against the other. So I am compelled to avoid both in seeking facts and in forming opinions. I shall, however, in the course of this part of my subject, present an array of indisputable facts, and leave it to those who are interested and qualified to draw their own conclusions.

CHAPTER III.

THE FIELD FOR ENGINEERS.

There are all kinds of engineers, and, as most of the engineering work is comparatively simple, it is not surprising that a large number of engineers are not technically educated in the schools; in fact, it would be the height of folly to send this class of men to school.

Perhaps not more than five per cent of all engineering work requires the skill of the most highly trained engineers. And when practically all of even this five per cent of important work has been done in the past by non-technical-school men, where is the sense of sending the rest to be technically educated in the schools, especially when we consider that a man can earn good wages while learning engineering in a practical way.

Uncommon Brain Capacity Needed.

It seems to be clear that the great engineer must be a man of unusual brain capacity, whether he be school-educated or self-educated. This is self-evident. It also is perfectly clear that no school can give a man brains.

Any one who has had large experience with men in factories, or in doing any kind of public work that requires a large number of men, knows that men of brains are an exceedingly scarce article. Probably

not more than one man in a thousand, even among those who go to technical schools, has any unusual amount of brains.

The object of the man of unusual ability going to a technical school is to learn the hidden things, and the important things of unusual practice; and probably not more than one year would be required to learn all there is in this line.

When we take into consideration that it costs probably $5,000 to give a boy a technical-school education, and that, as above stated, not more than one person in a thousand who attends these schools has the brain capacity to make an eminent engineer, it will be seen that the education of the one person who is really benefited by the schools cost $5,000,000.

Big Cost for Small Results.

If exception should be taken to my figures, let it be conceded that only one in one hundred having the brain capacity for such training, the training of this one would cost $500,000. Or, even admitting that one in every ten might be benefited, his education would cost $50,000 — even the smallest figure being a pretty stiff price to pay for what little he gets of practical value.

There seems to be a difference of opinion between the English and the German people as to the best way to produce engineers. The former, as I understand it, believe that engineers should be given more of the practical experience and less of the theory; while the latter claim to be able to make better engineers by giving more of theory and less of practice.

History and the most readily obtainable facts favor the English side of the question most decidedly — that is, the greatest engineers the world has known, those

who laid the foundation for practically all of the engineering knowledge we have to-day, belonged to England and were wholly without technical-school education — or even general education except of the most ordinary kind.

Engineering in England.

While no engineering works of particular consequence were undertaken in England before the latter part of the eighteenth century, apparently all the greatest problems in engineering were solved in that country within the following hundred years by these self-educated engineers.

It is evident that before the engineering problems were presented and worked out there could have been nothing upon which to base courses in technical education; so where I do not find mention of technical-school education in the training of the great engineers of that day, I assume that there was none to be had that was of any account.

Yet how it must impress us when we consider the wonderful amount of skill and ability and wisdom displayed by these founders of the engineering profession in England. As the problems arose, the Englishmen were equal to the occasion, and soon there was a demand for engineering talent of the highest order, and an immense amount of work was accomplished in the most intelligent manner.

An Array of Brilliant Men.

Look for a moment at a few of these notable men and their equally notable achievements:

John Smeaton, the father of civil engineering in England, began as a mathematical instrument maker;

but as a self-taught engineer he has left the present Eddystone lighthouse, a number of drainage works, docks, bridges, etc., not to mention many valuable papers on engineering contributed to the Royal Society.

Brindley, the father of canal-building in England, was apprenticed as a millwright, but later took up engineering. His first canal, a perfect level waterway between Liverpool and Manchester, is one of the wonderful engineering feats of the age. Brindley was considered the foremost engineer of his day, and further proofs of his skill are to be seen in roads, bridges, waterways, etc., throughout England.

Rennie, Telford, Brunel.

John Rennie rose entirely by his own merits from a machinist to the crowning engineering triumph of the Southwark and the Waterloo bridges over the Thames — still among the notable and beautiful structures of the world, the Waterloo bridge having been declared by the celebrated Canova to be "the finest fabric of the kind he had ever seen." The Crinan canal and many docks, not to overlook the Bell Rock lighthouse, are further evidences of Rennie's greatness.

Telford was a mason in his earlier years; then took up engineering and became one of the world's most notable bridge-builders. His suspension bridge over the straits of Menai was a structure spanning more than five hundred feet and the first of its kind.

As it consisted of stone pillars on each side of the strait to carry chain-cables from which the bridge proper was suspended, and as the problems involved were not only new but were practically the same as those connected with the building of all such structures

since that day, it is not difficult to see in all the suspension bridges of later years merely a reproduction of the Telford bridge — no matter what their size or the material used in the construction of other noteworthy suspension bridges.

I might also mention the Chirk aqueduct, the Coalbrookdale iron bridge, the bridge of Dunkeld, Scotland, Harecastle tunnel, the Caledonian and other canals, and several drainage works and docks, all speaking eloquently of Telford's surpassing skill and ability as an engineer.

The First Thames Tunnel.

Sir Isambard Brunel stands as the successful builder of the first tunnel under the Thames, and as the inventor of the tunneling shield, the principles of which are the same as those in the shields of to-day, though the methods of operation are somewhat different.

This was but one of Brunel's many engineering achievements, but I regard his tunnel under the Thames as one of the greatest pieces of engineering even up to the present day. When we consider that the difficulties of such a task were many, that the problems to be worked out all had to be solved by him, and this at the very birth of extensive tunnel construction, we can not hold Brunel in too high regard.

To avoid steep grades at either end, Brunel ran his tunnel at so high a level that in places the crown of the brickwork came to within four feet of the water of the Thames. Naturally this increased the difficulties of construction; yet during the twenty years in which the great work progressed, the most trying situations were met with untiring persistence

and uncommon skill, and no problem in such construction was left unsolved for the tunnel-builders of the future.

Important Problems Solved.

It is well to keep this successful achievement in mind when we are considering the problems presented by such tunneling as is going on under the rivers around New York city, for Brunel was the father of all this sort of engineering.

Following Brunel as a tunnel-builder came Barlow. His Tower tunnel under the Thames was a successful piece of work, but not to be compared with that of Brunel, for at no point did Barlow allow less than eighteen feet of solid London clay to come between the crown of his tunnel and the bed of the river; and, besides, he had all the advantages of the shield invented by Brunel.

This much for the non-technical-school engineers of England, and what they did to merit a high place in the world's history. America also has had men of this caliber and of this practical training.

American Engineers.

One of the earliest engineering works of magnitude in this country was the building of the Erie canal, a waterway nearly three hundred miles in length and with numerous locks. Considering the time, the facilities, and the comparative youthfulness of engineering, this was a remarkably good piece of work. It has stood the test of years, and it stands to-day as a complete and satisfactory piece of work; in fact, no better canal has been built since then, which may be consid-

ered ample proof of the skill and thoroughness of the men who planned and built it.

Prominent among these were James Geddes and Benjamin Wright. After the canal commission, about 1810, had imported at large expense an engineer from England — William Weston by name — and he had failed to satisfy the commission as to his ability, Messrs. Geddes and Wright offered to undertake the work if the commission would give them its full confidence.

The Work of James Geddes.

The offer was accepted, and from that time until the completion of the canal, in 1825, the name of James Geddes is most prominently connected with all the active and practical work.

Mr. Geddes was of fine education, though almost wholly self-educated. He was a farmer's son, and studied while following the plow. He became well versed in foreign languages and was one of the best mathematicians of his day.

Assisted by Mr. Wright, Mr. Geddes made some remarkable surveys of the route of the canal before actual construction began. Starting at points about two hundred miles apart, the two surveyors ran their levels toward each other, and these levels met with a variation of only a trifle more than an inch. This feat compares favorably with some of the work of modern engineers in running levels for tunnels.

Considerable has been said at various times about the surveying, especially of the tunnels through the Alps and the tunnels under the rivers around New York. Apparently many think it was a very clever piece of engineering to have these tunnels surveyed so

accurately, commencing at opposite ends; but in this case we see that the levels were run for two hundred miles absolutely accurate, where the East River tunnel is only a couple of miles long — so that it appears from this that the old-fashioned engineers understood this business fully as well as they do to-day.

Most Successful Engineering.

From these facts, and the further fact that the canal was finished under the direction of these men, within eight or nine years, and was in every way a successful piece of work, the names of James Geddes and Benjamin Wright have earned the right to be included in the list of civil engineers who without the assistance of the technical schools have done work equal to the best that has been done by any of the world's eminent engineers in this line since then.

Another good piece of early engineering was the original Croton aqueduct, by which pure water was brought into New York city.

John B. Jarvis, designer and constructor of this aqueduct, began as an axman on the Erie canal. He was promoted to the position of rodman, and when the canal was partly finished, he was made resident engineer of a seventeen-mile section of it.

In 1825 he was made superintendent of resident engineers. Later he became chief engineer of the Delaware and Hudson Canal Co. Other positions of trust and importance followed, until in 1848 he was made chief engineer of construction for the Croton aqueduct. This aqueduct proved a great success, and is still in use. This aqueduct across the Harlem, while it is not a wonderful piece of work, has been for all these years an object of great admiration.

In 1850 Mr. Jarvis visited Europe and was received with great honors on account of his engineering achievements.

Dry Dock at Brooklyn.

Another good piece of engineering work in the early days was the building of the dry dock in the Brooklyn Navy Yard, which was built in the 40's. I do not know the size of the dock, but it was a large one for those times, and the engineers met with great difficulty in consequence of quicksand in making their coffer dams and getting a proper foundation for the dock; but they were able to overcome all difficulties and made a very successful piece of work. There is no piece of engineering around the city of New York to-day that is worthy of more praise than this. But, unfortunately, I do not know who the engineers were who are entitled to credit for it, but, of course, it is safe to say that they were not technically educated men, because there were no such men in the country at that time.

Another early engineering feat was the development of water power at Paterson, New Jersey. I do not know the engineer, but the work was done about one hundred years ago, and I think stands exactly the same to-day, which, of course, proves the perfection of the original work. The water power is constructed on three different levels.

James Buchanan Eads, in point of achievement, was one of the greatest engineers this or any other country has produced. His great bridge across the Mississippi at St. Louis was notable in every way, its

main span of five hundred feet having been pronounced the finest piece of metal archwork in the world.

Notable Work of Eads.

But the most remarkable feature of this bridge was the caisson work and the building of the foundation and piers, which was by far the greatest piece of engineering work of its kind produced before or since.

His jetties in the Mississippi encountered and successfully solved problems of the first magnitude, and it must not be forgotten that in the projection of these he was opposed by practically every engineer of the United States army, who finally were compelled to admit that he was right.

Eads was the first American citizen to receive the Albert medal from the British Association for the Advancement of Science, as a recognition of his signal engineering achievements.

Eads was a man of liberal education and broad culture, but almost wholly self-taught. At thirteen he was compelled to quit school and to help in the support of his brothers and sisters; but he always found time for the reading of the best books he could secure. It was in the school of practical experience that he gained the deep and accurate knowledge so successfully applied in his notable career as an engineer.

William Howe is another name that deserves honorable mention here. About 1840 he invented a combination truss which became widely known in the building of many of the earlier bridges. It is undoubtedly a fact that Howe thus became an important factor in the building of the first railroad bridges in this country; and when we consider the large part that wood played in these structures, Howe must be classed as

great as any of the bridge inventors and designers who followed him.

I might mention here other builders of bridges, but in recent conversation with one of our oldest engineers, who has had a large amount of experience, I was informed that the planning of the best railroad bridge work over the Mississippi and Missouri rivers was about equally divided between practically educated engineers and those who had received a technical-school education.

The Mormon Temple.

The Mormon Temple at Salt Lake City is worthy of mention here. I do not regard this as any great piece of engineering work, except when we take into consideration the men who planned and built it, and the conditions under which it was constructed.

The building of this temple took three years. The roof is an elliptical dome, resting upon forty-four buttresses of solid masonry. No nails or iron were used in the construction of this dome, or in any part of the building, all timber joints being tied together with buckskin thongs.

The building is two hundred and fifty feet long and one hundred and fifty feet wide. The ceiling of the roof is nearly seventy feet from the floor and is arched without a pillar. The full height of the structure is eighty feet.

The building was designed, as to general appearances and dimensions, by Brigham Young, then president of the Mormon Church. It was constructed under the supervision of Henry Grow, with Truman O. Angell, official church architect, as adviser on all difficult problems which might arise.

Brigham Young was a carpenter and joiner. He used to say that his entire formal schooling covered a period of three weeks. He had a natural aptitude for architecture, but not even the rudiments of technical education.

Henry Grow also was a carpenter. He did a good deal of bridge-building, and built the first suspension bridge in Utah, across the Ogden river.

Truman O. Angell also was a carpenter, a man with scarcely any school education, a natural architect, with not a particle of technical education.

These men simply were good mechanics, and did not claim to be engineers. Yet how good was their work, how remarkable when we consider that no iron was used in the construction of this temple, and that it has stood all these years without showing defect.

Work of Practical Men.

Probably no technical man could have done this work, or have admitted that it could be done. He would have depended upon his scientific education and the school way of doing things, and these would not have allowed him even to imagine that the Mormon Temple could have been built in the way it was done by ordinary mechanics. If the Mormons had depended upon a technical-school educated man to guide them in these matters, it would not have been built until they could have procured iron. Incidentally, I would mention that the acoustics of this building are probably the finest of any building in the world.

When we come to some of the work of the technical-school men of this country, I would say that my attention has not been called to any technical-school

educated engineer's work of special importance, excepting that around New York city, so I shall confine myself to the work done there.

Persons of any observation can see that there has been a great amount of large engineering work constructed, comparatively within the last few years, and to a person not familiar with the subject I can readily understand that it would seem that there was a great deal of wonderful engineering ability connected with it, and undoubtedly there is a lot of good engineering work.

The Brooklyn Bridge.

I mention the work of a highly technically educated engineer, Mr. John A. Roebling. Mr. Roebling started in this country in engineering work in making a mechanism for hauling canal boats up an incline, and did some canal work. He seemed to have been the originator of, or at least early in making, wire cables.

His first suspension bridge was built at Pittsburg over the Monongahela river, which was a success. He afterward built the suspension railway and vehicle bridge across the Niagara river, which also turned out to be a great success.

His next great piece of engineering work was the Brooklyn bridge, which is another notable achievement as a piece of engineering work, and is beautiful in its architectural construction. I can say the same of the Williamsburg bridge; they are both works that I take great interest and pleasure in, and I never go to New York without going over both of them, and I feel that the men who designed and constructed them are certainly entitled to a great deal of credit, even

though they did not evolve any new scientific or great engineering features.

Old Principles Employed.

Of course, the principle of the suspension bridge is old, and there are no new features connected with the bridge, although Mr. Roebling is, however, entitled to great credit for having advanced this style of construction away beyond anything that had previously existed. He and his assistants were also entitled to great credit for figuring out the proportions and strength, and designing every detail, which he appears to have done with the greatest proficiency. This involved an enormous amount of good close study of all the factors that entered into such a gigantic undertaking.

I have it on good authority, however, that when it came to actual construction, "in place of assistant engineers, he (Roebling) preferred to work with intelligent, practical foremen, such as master masons, master carpenters, master machinists, etc."

Now we come to the Pennsylvania tunnel and the station work. I have in my correspondence memorandum papers stating that the engineers in charge of the designing and management of these tunnels were Alfred Noble, C. L. Harrison, S. H. Woodward, James Brace and Francis Mason. I understand that they were all technical-school educated engineers.

I understand that they had at one time about four hundred engineers on the job, which looks as if they were running a refuge for technical-school men who couldn't get a job any place else.

I also have the following statement in regard to this subject from Charles M. Jacobs, chief engineer

of the Hudson and Manhattan Railroad, in reply to a letter of inquiry I sent on this subject.

"With reference to the general character of education in proportion to the practical side, as mechanical engineering forms such an important factor in the consideration of these works, the best men have generally had mechanical training, working in shops, and more particularly in mining works, and then obtaining experience in underground mining."

New York Tunnel Work.

I would say in addition to what Mr. Jacobs says in regard to the successful tunnel builder, that in my opinion some of the most important things about tunneling under the river are that the engineer should have a complete knowledge of the difficulties he may get into, and at all times be prepared to meet any emergency. The principal sources of trouble that he may get into are quicksand and flow of water, and he must be keen to observe the slightest indication of trouble ahead that he may guard against it.

In this job they start in at Bergen hill with the tunneling. Of course, there is nothing new or great in making a tunnel through rock under ordinary circumstances, but in tunneling through the earth from the rock to the bank of the river may arise problems that require good practical engineering ability.

We now come to the portion of the tunnel work under the river, which presents problems of the greatest magnitude, and, in fact, there is no problem of engineering to-day that requires better judgment, skill and experience than this class of engineering. But all of these engineering features were covered by Sir

Isambard Brunel, who built the tunnel under the Thames over a hundred years ago.

Size Not Very Important.

As to the hole in the ground in New York, there is, of course, nothing great in this. A person who can blast a small hole can blast a big hole if given time enough, so it will be seen there is no new engineering feature connected with this whole subject.

As to the engineering feature of this work, I would say, it is difficult to understand where technically trained engineers can be of any great service in work of this kind. Certainly, the building of tunnels is not a matter that technical schools are likely to know much about, and I would say that notwithstanding the above fact that the engineers connected with this job claim to be technical-school educated engineers, I will venture the information that such a man as Mr. Jacobs describes as having practical experience in this work, is altogether a more important man, and absolutely indispensable in carrying out work of this kind, whereas the technical-school educated man is, in my opinion, simply an ornamental figurehead. In other words, I maintain that such a man as Mr. Jacobs speaks of could carry out this whole job without the assistance of a technical-school educated man.

Take the underground system of railroads, the same is true of them; there is no great engineering feature connected with them. It is much the same as the case of the Pennsylvania Railroad tunnels. It wants a man of large experience in this kind of work and of good common sense. Of course, the engineers laid out the routes, size, stations, etc., which is no great

engineering problem. And what is true of these jobs is true of everything around New York city.

There is an immense amount of good mechanical work in these jobs, which, of course, is all done by the practical man. The glory of all this work belongs as much to him as to the engineer. The mechanic could do pretty near all this work without an engineer, but the engineer could not do any of it without the mechanic. Yet the engineer is getting all the glory and credit for this sort of work. For example, the practical man, in erecting the Brooklyn bridge, performed quite as meritorious a piece of work as Mr. Roebling did in his part of designing it.

Some engineers claim that we have bigger engineering problems to solve to-day than they had years ago; therefore, that it is necessary to have engineers with technical-school education to handle them. Admitting that the problems of to-day are greater, they would embody the same principles as those of an earlier day, and practically all of them were solved before we had any technical schools.

It is easily seen that once we have mastered the construction of a bridge to carry a fifty-ton locomotive, a bridge to bear a hundred-ton locomotive presents no new problems. If these engineers were called upon to-day to build a wooden railroad bridge of the same character that we had before the introduction of steel and iron, they would find it very much more of a problem to build a wooden bridge to carry a twenty-five-ton locomotive than they did to increase the strength of a bridge strong enough to carry a fifty-ton locomotive to one that would carry a hundred-ton locomotive.

Buildings of the Past.

This applies to all sorts of construction work. Our buildings to-day are no bigger than some of the buildings that were constructed hundreds of years ago. We are not doing anything in this line that surpasses the Pantheon, the Coliseum, or St. Peter's in Rome, St. Paul's in London, or many other examples of the best of the designer's and the engineer's art that the world has seen.

From all that I have said upon this subject, it is evident that there are two ways of making engineers.

The technical-school way is to take the boys without any particular judicious selection — take them "just as they come" — and give them a technical training, without any regard as to whether or not they have brains or any unusual ability. The schools seem to go on the idea that they can make good engineers out of anybody.

The other way is through practical lines. For example: If a bridge-building firm should select its apprentices with care, giving them a thorough training in the construction and erection of bridges, and after this training, if it is discovered that they had unusual ability, then if the company would furnish them with books giving the exact theoretical training that they require in their particular business, the company would, in my opinion, get far superior men to those produced by the usual technical-school method.

Get Theory from Books.

Notwithstanding the fact that the evidence shows there is no occasion for the ordinary engineer to go to a technical school, it does not appear unreasonable

that he might get some benefit from schooling. But, whatever he requires in this way he ought to be able to get to better advantage from the correspondence schools, perhaps, than from the regular technical schools, though what he requires are matters he could get right from books. He knows what he wants, but may not know the books; he does not need a teacher to urge him to study, and the teacher does not know anything but that contained in the books, and in this case he is working and studying, and making a living at the same time.

One important reason why the practical engineer in general lines is likely to turn out better than the technical-school trained man is that he has been, in the first place, like the case of the bridge man suggested above, selected by his employer because he appears to have natural ability and has been promoted to higher positions when his employer found out that he had superior ability.

I realize that the technical schools will answer my statements by saying that their graduates are in great demand by business men whose judgment can not be questioned. On this point I will say that there is a certain amount of truth in such statements, but the question is whether it really proves that these schools are important.

Results of an Inquiry.

In order to ascertain just what the demand for these boys amounts to, I sent a letter of inquiry to graduates from the engineering departments of the universities of Wisconsin, Illinois and Michigan, who were graduated about five years ago.

From the one hundred replies that have been

received, I find that the average income of the graduates, at the time they began work, was about $700 a year, which is about the price of common labor.

This surely does not prove that employers put any unusual value on the services of such men. My inquiry also shows that after eight years of schooling and five years of business, or a total of thirteen years,* their pay averages $1,700 a year. Admitting that these graduates are in demand, this certainly does not make any great showing as to the value the employers place upon them; so I claim that the demand on the part of the business men is shown to amount to practically nothing.

Value of the Practical.

If these same boys had gone into a factory and had paid for the permission of being promoted right through, they would have been much better compensated in a factory or business than they have been as technical-school graduates.

In the factory at the end of two years — say in the foundry — they would have sufficient ability to receive wages of at least $3 a day. Then, by going into other departments of connected trades — two years in the machine shop, a year in the pattern shop, a year in the blacksmith shop, making a total of six years, or about half the time the technical-school boys spend in their education and practical work — if they possessed brains and ability they would be fitted for positions, such as that of superintendent, paying several thousand dollars a year.

*I understand that the college requires the boys to have four years of high school and then four years of technical school. Five years of business added to this make the thirteen years.

I, of course, understand there are a great many people who are experimenting with these technical-school graduates; but it remains to be seen what the results will be.

Wrong Meaning of "Demand."

This claim of the colleges of having a demand for these boys is much the same as the claims that the classical educational institutions are making, that their young men are in demand. They do not seem to comprehend the difference between a thing being in demand when a $5,000 article is given away and when it is sold for a profit.

If a manufacturer produced an article that cost $5,000, and had to give it away, he would not be bragging about his flourishing business. This idea the educator can not get through his head.

I don't think there ever was an educated man who went out of the college and got a salary in proportion to what his education cost. These graduates generally have to go to work at common laborer's pay, and this is what the colleges call "men being in demand."

But what if these graduates are in demand by one in ten, among employers — which is not an exaggerated statement — what does that prove against the other nine employers who do not want such men?

To sum the whole matter up, it seems to me that it is absolutely clear that the old engineers of England, who developed pretty much everything there is in connection with this subject, and American engineers who have done all the work in this country up to Mr. Roebling's time, prove that we can get along very nicely without technical-school educated men for all this kind of work.

I also wish to say that, in my investigation of this subject, I have not discovered where any technically educated engineer has constructed any better work than the old practically educated engineers, and I do not know of any case where any of them has devised or invented any important and fundamental device or discovered any principle connected with engineering work.

As for mining engineers, I believe that this branch differs but little from civil engineering, as it consists principally in sinking shafts, making tunnels, pumping, etc. I have made some investigations in this line, and was not surprised to find that the best early mining engineering work was done in California and that vicinity, practically all of it by engineers who were not technically educated in the schools.

Therefore, what I have said here regarding civil engineering applies as well to mining engineering, hydraulic and drainage engineering, and so I may dismiss these branches of engineering without further consideration.

CHAPTER IV.

TECHNICAL EDUCATION IN ELECTRICAL ENGINEERING.

Electrical engineering, in consequence of being somewhat new, is looked upon as being a very important feature of general engineering. The colleges appear to think there is no danger of producing too many electrical engineers. The result is that every college has a course in electrical engineering, and a hundred of these engineers are turned out where ten would amply supply the actual demand.

It may be necessary that those being trained to become electrical engineers should have a considerable amount of technical education. It is equally true that many of our best electrical engineers were made in the earlier days — and are still being made — without having attended technical schools.

The question I raise, therefore, is this: Can this necessary technical knowledge be secured more economically in connection with the practical work of the factories, or by taking a course in some technical college?

Schools of Small Importance.

When really strong electrical engineers, such as I have referred to, can be produced in the ordinary run of business, it seems to me that this fact should impress every one as reasonably conclusive evidence that in this

particular line the technical schools are of exceedingly small importance.

I think that while this matter of making electrical engineers has many complicated problems to solve, it is much the same as is the making of other engineers, as I have explained in my previous papers; the electrical engineer may be developed enormously in the factory, more especially with the aid of some systematic schooling.

In going into this subject I thought I would better have clearly in my mind what an electrical engineer is supposed to be, and I wrote to the two chief divisions of the General Electric Company and asked the following question:

"What is an electrical engineer? What is he supposed to know and be capable of doing on leaving your works?"

Mr. Alexander's Definition.

From Mr. M. W. Alexander I have the following definition:

> I am hardly prepared to give an authoritative definition of what an electrical engineer is and what he is supposed to do. In a general way, however, I should say that an electrical engineer, in the accepted definition of the term, is an educated man who has specialized on the study of engineering, and particularly electrical engineering theories and phenomena, and who, through the broadness of the studies he pursued, has learned to reason from cause to effect, look ahead, so to speak, to view things with an analytic mind. He should be able to apply the theories of the sciences to the working out of electrical engineering problems, and should, based on his analytic power, be able to use sound judgment in applying the proper values to the undetermined quantities of the problem. He should, furthermore, be capable of evolving new theorems and practical applications.

The striking thing about Mr. Alexander's definition is that he is so uncertain and so confused as to the qualifications of an electrical engineer. It seems to me that a person undertaking to make an engineer, or an engine, or anything else, should have it clear in his mind what he is aiming to do and shape his course accordingly.

Some Obsolete Teaching.

As I shall show in other parts of this discussion, Mr. Alexander claims that these engineers are very deficient apparently in the qualifications he lays down for an electrical engineer; and, as I understand from Mr. Alexander and have understood from others, electrical engineering is far from being fully understood and from being reduced to an exact science. I also understand that the text-books are soon out of date, and, of course, the teachers are likely to be considerably behind the times, as Mr. Alexander intimates they are. The result is that a good deal of their teaching is obsolete, and therefore of no value.

Consequently it would appear that the engineers the colleges are turning out, with Mr. Alexander's four years of additional training (as I shall refer to later on) come far short of meeting the requirements of an electrical engineer as he and Mr. Rohrer (whose definition follows) lay down after all these twelve years of combined study and practice.

From Mr. A. L. Rohrer, general superintendent, I have the following definition:

> An electrical engineer is one who is familiar with the general theory of direct current and alternating current, and with all phenomena relating to the generation of electrical energy, its transformation and its distribution.

> It is desirable that he possess in addition to the above a good knowledge of mechanics, both theoretical and practical, so that he may have the practical appreciation of the value of machine-tool processes, the labor and material, and to have the ability to analyze the many problems which may confront him.

It will be seen that Mr. Alexander and Mr. Rohrer only partially agree in their definitions. Mr. Rohrer claims that electrical engineers should be familiar with transformation and distribution, also with machine work, which Mr. Alexander does not mention.

Narrow Limit of Efficiency.

In any event I am greatly surprised at the narrow limit which these men put on an electrical engineer.

Apparently they look upon him as a man who can improve electrical machinery. This really is the point Mr. Alexander makes. He does not claim that the engineer should be able to install and manage this machinery, and all that.

Now I have always thought that inventing is something that can not be taught — that is, it is something that must be born in men.

I had the idea that an electrical engineer was a much bigger man — a man qualified to do what I have outlined below.

There is demand for an engineer who can answer clearly the points enumerated when called upon by the authorities of a town that is considering a public lighting proposition, and I had supposed the technical colleges were aiming to produce this sort of engineers.

An All-around Engineer.

The first thing the town wants to know is what the plant will cost, what it will cost to distribute the cur-

rent, and what the profit will be. To give this information the engineer must be able to determine:

1. The size of the plant for immediate use.

2. The needs of a near increased demand for current.

3. The plan for enlargement at a considerable time in the future.

4. The general lay-out in order to determine the size of the building.

5. The amount of land required.

6. The location.

7. Whether he will put in a condensing or a non-condensing engine, which will depend on the facilities for getting water for condensing. If the supply of water is some distance off, he must determine whether it will pay to go so far with his plant and carry his current so far in order to get the benefit of condensation.

8. To settle the question of getting the fuel to this plant. If the fuel supply is off some distance, the question arises of putting in a switch or of hauling his coal by team. He must determine whether the disadvantage of getting the current to the town is more than overcome by the gain of being close to a fuel supply.

9. Convenience in handling the coal in connection with the boilers.

10. Laying out the boiler-room, and the size of the chimney for present and future demands.

11. Choice of boilers — (a) whether tubular or pipe boilers; (b) whether the plant will be a saturated-steam or a superheated-steam plant; (c) whether he will put in a reciprocating engine or a turbine engine; (d) what make of engine.

12. All the details of fixtures connected with the engines and boilers.

On the Electrical Side.

When it comes to the electrical side, he must know all about the theory and practice of that, in regard to knowing what current it is advantageous to use and the choice of generators.

He must also know as to the size of wiring through the town.

He must also be familiar with the practice in building foundations, arranging and installing machinery to the best advantage for the present needs and for future additions.

He must be capable of making a reasonably close estimate of the cost of this whole apparatus.

Now let us see how near the technical colleges come to producing this kind of an electrical engineer. After eight years of education (high-school and college) the college has turned out what it calls an electrical engineer. What kind of an engineer is he?

Failure by the Colleges.

It may be seen readily from what these colleges have produced that they have failed completely in coming anywhere near to filling the bill I have just outlined.

On the other hand, the practical way has turned out many such all-around engineers. So, when we contrast the college method with the practical method in this line alone, the practical method stands in the proportion of about 100 to 10 for the college method.

Now, if the practical way has produced the 100 per cent engineer — and is still producing him — why so

much fuss and so much expense about the technical college and its 10 per cent engineer?

It seems to me that it is a great oversight in all this engineering business that none of the technical colleges has made an attempt to meet these practical requirements. There certainly has been time enough devoted to the making of engineers to turn out those of this general character, and I had supposed heretofore that this was the aim of the technical college, as well as of such companies as the General Electric.

The "Engineer Apprentice."

The General Electric or the Westinghouse does not call the engineer graduate from the technical college an engineer, but an "engineer apprentice"; and they give him four years more of training, yet still say he is far from being an electrical engineer — which is perfectly evident.

So I think I may say that, after the General Electric, or any other company, has put four years more on these young men, they still may be called "engineer apprentices," and they still have a great deal to learn, which will take them several years more to acquire, and this can not be learned in any college or factory; they have to get right out in the practical operation of the electric plants and learn them and from them by experience.

It seems to me that the way to make electrical engineers of these men, after the General Electric Company is through with them, is to have them get out and take a job in helping to install machinery, and afterward to work in the plant taking care of the machinery, or firing and working up as a practical

engineer, and in this way become familiar with the care of the machinery, and get a knowledge of the steam side of it.

Give Him Some Practical Work.

After spending, say, two years, in this line of work, if the young man could get a position in some active, wide-awake engineering office and put in several years there, making altogether about sixteen years in learning the business, he might finally amount to something as an engineer; but he would still be lacking in the mechanical way of knowing how to make things, and through this knowledge to learn of their merits, which he should have learned in the machine-shop.

I would say here in regard to electrical engineers — as I have said in the chapter on civil engineers — after they have all the knowledge and experience I have mentioned they will not amount to much as engineers unless they are men of unusual ability. In engineering, as in everything else, the success of a man depends on his brains. This is more particularly true of electrical engineering, for in this field there is no place for the man of mediocre ability.

A Very Broad Difference.

It will be seen that there is a broad difference between what I supposed was an electrical engineer and what the General Electric Company and others call an electrical engineer.

Instead of knowing what I have assumed he naturally should know, he is an exceedingly small man, even judged by the value that such concerns as the General Electric Company put on his services and

talents. To have eight years of advanced education and four years as an engineer apprentice (twelve years in all), and then to get thirty cents an hour for his labor, may be a good thing for the General Electric, the Westinghouse, and other manufacturers, but it ought to be somewhat discouraging to the young man who has gone through it.

As I shall show later on, many of these men called electrical engineers are not getting half as much pay as is received by many good mechanics.

I am fortunate in that I am not required to bear alone the burden of proof as to the defects existing in the present system of making electrical engineers; for I have in my possession a paper by Mr. Magnus W. Alexander, on "The New Method of Training Electrical Engineers," which was presented at the twenty-fifth annual convention of the American Institute of Electrical Engineers, at Atlantic City, New Jersey, June 29, 1908.

In this pamphlet of thirteen pages, Mr. Alexander has gone into the subject exhaustively. The pamphlet, I maintain, proves my judgment that the system generally in vogue of producing electrical engineers from technical-school graduates is a mistaken idea.

I do not know what system the General Electric Company had at the Lynn plant in making its engineers up to the time described in Mr. Alexander's paper, but I do know that in Schenectady the company had a very crude one not long ago, referred to further on; and I presume that Mr. Alexander had much the same system at his plant previous to going exclusively into the making of engineers from technical-school graduates.

One System That Failed.

Some time ago, however, the company adopted the following: It provided a two years' college course for the college boys, expecting, apparently, in this way to make thorough electrical engineers of them. The company instituted what it called a "thorough-going system," educating the student-apprentices on all lines, in order to make them not only competent engineers, but acquainting them with the value of the Company's products as compared with the products of competitors.

It also was aimed to make salesmen through this system. There were special shop committees to look after the training.

Mr. Alexander states that he has had dealings with several hundred of these graduates, and apparently at one time had great faith in the work they were doing, but finally concluded that "it was not the most effective method of training designing and construction engineers."

He continues:

> It fails to give that insight into the practical side of electrical engineering and into the proper relation of the economic forces of an industrial organization that is more and more demanded of those who wish to take leading positions in the industrial fields. Moreover, the atmosphere at the college is charged with little of the seriousness of business. The correlation of theory and practice is not sufficiently close to facilitate the proper appreciation of the sciences in their concrete applications.

He also volunteers the information that he thinks this is the experience of other people who have engaged college graduates. He goes on to a considerable extent giving good reasons why colleges fail and explaining their shortcomings.

A Theory of Co-operation.

The method above described not giving the desired results, Mr. Alexander has now a theory of what he calls coöperation, and he has become convinced that the proposed system will overcome all the defects of the previous plans.

The coöperative plan is to divide the time equally between the factory and the college, but as to the length of each period he is not clear. He is inclined, however, to think that a month in the shop and a month in the college, running this along for five years and winding up with a year wholly in the college would bring the best results. He takes the ground that practice and theory should go more hand in hand than has been the case thus far.

It is better for the youth, he contends, to have much more of the practical side of engineering. One of the ideas that Mr. Alexander appears to have on this matter is that if the boy has the association of the factory it will prevent him from being demoralized by the college, and that it will bring him to realize what the making of an engineer means — particularly what being a successful engineer means.

He also has the following to say in regard to the merits of the plan:

> Above all, it will produce engineers technical in their specific knowledge, cultured in their usefulness of life's activities, sympathetic in their understanding of the aspirations and needs of men, and broad and enlightened in their conception of their own obligations as engineers and as citizens.

Of course, this scheme is like the previous one he has tried — in that it is simply an experiment. It

seems to me to be a new idea and to have the approval of several others; but in view of the fact that Mr. Alexander has failed in his previous schemes there does not seem to be any particular reason why one should have any great confidence in this, as it has not been indorsed by any one who has had experience with it, and not recommended to any extent by those who have not experimented with it.

In regard to this new system, Mr. Alexander has a great deal to say about its superiority over the previous one above mentioned, as will be seen.

Trying Various Plans.

To my mind when he adopts a new system and claims great merits for it over the old one, it naturally follows that the old one was defective in all the things for which he claims merit in the new one.

The astonishing thing about the whole matter is why he was ever so enthusiastic over making electrical engineers from the technical-school graduates, in view of the fact that he now sees so much defect in it; and especially is it strange that he carried the thing so far as to try hundreds of them.

It seems to me that the defects of the former system should have been apparent much sooner to any practical man.

With all that I have said in regard to Mr. Alexander's previous plans, I think it is only fair to say that I believe his present plan is better than the one he has abandoned — that is to say, he is now getting toward the plan that has a little sense to it, for the reason that it gives very much more shop practice, but still is a long way from the correct one, as I think I can make clear before I get through with the subject.

A Serious Question.

It must not be lost sight of that Mr. Alexander in the past has recommended a plan that involves eight years of schooling — that is, four years in high school and four years in college — in addition to two years in the factory and two years in the engineering department, making twelve years in all, to produce what is now, according to his own statement, a failure in making engineers.

This fact of taking twelve of the best years of a young man's life is certainly a sad thing to reflect upon — and not only taking his time but also his money — and a few such men in this country are responsible for this terrible calamity.

Mr. Alexander's factory represents more brains, more ingenuity, more schooling and more that counts for education than all of the technical schools and colleges that exist.

His condemnation of the technical school is the most severe of that of any person I know.

No college can be compared for one moment with the educational facilities of such concerns as the General Electric. Of course, the company not only has the advantage of the manufacturing end of the business, but it has immensely better engineers to look after the theoretical training than any college could afford to have.

I am also fortunate, and for the same reason given on page 198, in finding an article on this subject by Mr. A. L. Rohrer, electrical superintendent of the Schenectady works of the General Electric Company, in a publication of 1904. In this article Mr. Rohrer

has this to say, in substance, on the subject of making electrical engineers:

Views of A. L. Rohrer.

He states that, at the time of his writing, they have 264 men and these are all used in the testing department. He goes on to say on the subject of the qualifications of men for this department:

First. They must be graduates of some technical school, or

Second. They must have had such experience in a machine shop, repair shop or central station as would, in the company's opinion, enable them to do satisfactory work in that department.

I understand from other sources that in Schenectady some years ago they, to a certain extent, took green men right into the testing department, apparently to make electrical engineers of them.

It will be seen from this that Mr. Rohrer makes a tremendous drop from educated men having eight years of schooling to men who have had neither college nor factory training. So we have in the case of Mr. Rohrer more of the inconsistency referred to in regard to Mr. Alexander.

I do not agree with Mr. Rohrer that he can make electrical engineers without considerable theoretical and mechanical training.

From the General Electric Company I get some more rather important information in regard to what the demand for technically educated men amounts to.

Not Valued Highly.

In the company's system boys are taken for two years in the testing department, starting for the first

six months at 20 cents an hour until they get 27½ cents an hour. The boys then are taken to the engineering department, where they start in at about the same pay they have been getting in the testing department, and spend two years there.

From this it will be seen that they start in at practically laboring men's wages, and after spending about twelve years they get the average mechanic's wages, or about three dollars for ten hours' work.

Just here I would mention the fact that in Germany, it has been stated by a professor, this same class of men — technical-school graduates — who go into the factories do not get any pay at all. From this it will be seen what German manufacturers think of the technically educated men — and yet we hear so much of the value the Germans place on such education.

In a letter to Mr. Alexander, of the General Electric Company, referring to his paper on engineers from which I have quoted, I suggested that his company undertake to make its own electrical engineers.

He answered to this suggestion that it was not the business of a manufacturing institution to manufacture engineers.

In reply to this I would say that I think it is rather late for Mr. Alexander to take this position. He recognizes the necessity for making mechanics, and does make them, and he goes into considerable schooling in order to insure his getting good mechanics.

In the engineering line he takes technical men and gives them two years of education in order to make them good engineers and also puts them several years in the engineering department, which is practically going half way in making engineers.

So as to the policy I suggested I think it would

be but a small step to make the engineers complete, particularly in view of the fact he could make them to an enormous advantage, and the making of his engineers is of the same importance to the success of the business as the making of mechanics.

Suppose he should make these engineers himself and require them to pay for the privilege of learning the business, the same as the colleges do. Can not it be seen that this plan would be an enormous benefit to both him and these young men? In this way he not only would be receiving pay from them during this period, but would then get real engineers, and the young men, by becoming real engineers in this way, would get something of great value for their money, whereas the colleges can give them only the most meager qualifications.

A Valuable Suggestion.

This suggestion, I maintain, is worth millions of dollars to the General Electric Company and an equal amount to the engineers that are made in this way.

What factory that is paying for labor can compete against one in which the workmen actually pay for the privilege of working?

And as the help would cost nothing, why not use the tuition fees to buy material, and thus get both help and material practically without paying for it?

Another peculiar position that Mr. Alexander takes on the subject is in regard to the early electrical engineers. He admits that good engineers were made in the evolution and development of the business, but states that this method of making engineers is now impracticable because the business is brought up to a

high degree of perfection, and it was only through working on this evolution that they got to be great engineers, and that the technical-school education is now a necessity, taking the place of the advantages the early engineers had in digging out the science of the business.

An Absurd Proposition.

Now, to my mind, this is absolutely an absurd and ridiculous proposition, as I can not see how the technical-school education can take the place of the research work of the early engineers. Nor do I understand on what ground he can claim that better engineers were made before this science of electricity was thoroughly understood and was being developed than can be made to-day in a thoroughly up-to-date factory, where every feature of the science of the business and the skill and ingenuity of manufacturing have been brought up to the very highest pitch; nor is there any ground for such a claim.

To assert that a person can not be educated in a factory completely upsets the theory of education. If a person can not be advantageously taught at the factory where the article in which he is interested is made and thoroughly understood, and where the atmosphere is charged with the science of the thing, then there is no place on earth where he can be educated.

I think in connection with the subject it is well to look into several matters that few people consider, even among those who are actually concerned — and that is the great economical factor of learning by observation and association.

If we stop to reflect, of course, we can readily see that an enormous percentage of everything we know

we gain in this way, and the actual schooling that we find important is a very small part of the whole.

We all know that the most highly educated men are those who have traveled, read, and associated with numbers of intelligent persons; and what applies in this general way applies particularly to mechanics.

Value of Association.

As a matter of fact, if a boy goes into a factory to learn any kind of trade, it is a very small percentage of the trade that is taught to him. He learns most by observation and association, by seeing the things done. It is not necessary to teach him.

This not only applies to simple mechanics, but applies to some lines that have science in them.

Take the carpenter. There is no occasion for him to be taught the science of bridging floor joists, putting in braces and making simple trusses. The greater part of this he can see and understand its importance, and after seeing, it requires no science to enable him to do the work.

I think we may go a step farther and take the case of an unseen science, like electricity. While a boy can not learn anything of this science by observation, he can learn a large amount of it by association. To the contrary, a boy going to a technical school learns nothing by observation and association to his advantage.

Along the same line I will say that I heartily agree with what Mr. Alexander has to say in his paper on the other demoralizing effects that colleges have on boys, and to which I have referred previously — all of which is obviated in the method of making engineers which I shall outline hereafter. I will say, in addition

to the demoralization that Mr. Alexander mentions, that the industrial one is not the worst; the moral one is infinitely worse.

This being a fact, I can not understand how any practical man would ever think of sending a boy to a technical school to learn that which he can learn in the factory at the time he is learning the practical mechanical part of the business, and where he is making a living at the same time; in other words, beginning at the right end of the matter.

Where Advantage Lies.

Take a concern like the Westinghouse or the General Electric. A boy learning a trade with either of these companies has, to my mind, an enormous advantage in learning the business of electrical engineering. The whole surroundings and enthusiasm of great factories can not but make an impression on the boy of the importance of industry, and the grandeur of the business, its necessary economical operation, and the advantage of knowing everything associated with it. It inspires him with the most decided love and admiration for the work with which he is connected.

Any boy who has the right spirit in him certainly would be greatly influenced in his manly instincts by such surroundings.

I don't think there is any pleasure to be compared with that a mechanic gets out of a piece of good work. On leaving the factory at night he can see that he has accomplished a good day's work and produced a good job. This certainly adds much to his pleasure, especially when he sees one of the great turbine engines, such as the General Electric Company makes, of 20,000

horse-power, and he feels that he has made an essential part of it.

It seems to me this must make him feel like a man; whereas, the technically educated man, who has been taught to despise labor and industry and to depend on science for his livelihood, has nothing of this pleasure and satisfaction.

How Discontent Is Bred.

And the question comes in here that I have touched upon in some of my previous papers, of the breeding of discontent and disloyalty and the disorganizing of a business that grows out of bringing in outsiders to learn something that the boys in the factory know and understand fully as well; and these factory-trained boys are more competent to fill the higher positions than are college boys who are brought in.

I can not imagine anything more demoralizing to a factory than to conduct it on these lines; that is, by taking away the factory boy's natural right to advancement, which he has earned by his industry, skill and loyalty. It not only affects the boys who are directly interested, but it has a demoralizing effect upon the whole factory, as the workmen are not slow to see these blunders.

Every man who has a boy who is deprived of his rights gets soured, and the boy's friends get soured at the stupid, blundering injustice of taking away the boy's natural rights.

It is a matter of the greatest importance that the workmen throughout the factory can see that their boys are getting a chance to reach the higher positions.

A Substitute for the College.

You ask perhaps: As you condemn existing methods of training electrical engineers, what method would you suggest? My recommendation is this:

Select boys for the machine-shop apprentices with the greatest care. Watch over them carefully in the first instance to see that they are what the employers are seeking as material for good machinists. Give them a little outside training, as the General Electric is doing. If the foremen who keep close eye on the boys discover that any of them has unusual ability, let such be put in the line of direct training for electrical engineering.

Such boys as this, after having two years of practical training in the machine-shop — say one year at benchwork and a year at toolwork — shifting around considerably, would get the knowledge of that part of the work that is required to make of them good electrical engineers.

Then let them be put in the testing department a sufficient length of time to learn, under the same careful supervision, what is to be learned there, but see that they are advanced as rapidly as possible.

From this department a short course in the drafting room should be given.

Next, they might be put in the erecting and installing department; and then in the department where they have the steam and electric plants for a sufficient time to get a knowledge not only of the electrical machinery, but also of steam engines and boilers.

Now, this whole time, I should say, would not consume more than six years; and in such cases the companies would get much better engineers than they have

been getting, and the boys would be earning their living the whole time.

Carefully Prepared Reading.

During this time the boys could attend night-school as much as is necessary, and be furnished with books on the science of the different lines of electrical apparatus, books that contain only such things as the best practical men know to be essential. If necessary, lectures could be given advantageously by the companies' own engineers, who know decidedly better what these boys require than any school teacher could possibly know.

It would be a good plan for the companies to prepare their own text-books, so that only essential things regarding theories would be taught the apprentices.

Such great concerns as I have named, I maintain, could easily afford to give boys the training here outlined. What little this would cost the companies, in my estimation, certainly would be a good investment for the factory, as such boys would always feel under obligations to the factory and would be loyal and devoted to the firm. Undoubtedly, also they would grow into positions where they could do the factory a great deal of good. Such men are not likely to be running away because they can get a half-dollar or a dollar a day extra somewhere else.

I regret that I have not been able to get from Mr. Westinghouse, or the Westinghouse Company, an expression of opinion on this matter of making electrical engineers, but I have no doubt that conditions there would be found to be much the same as in the factories of the General Electric Company.

CHAPTER V.

MEDICAL EDUCATION.

I think that the readers who have followed me through my investigations of different lines of higher schooling must have seen that there is quite a variation in the degrees of curse pertaining to these schools.

The majority of the colleges that give a classical education only I believe no longer deceive the public to any great extent, for I have noticed that but few of them pretend to give the student anything of practical value. All they profess to do is to make him an ornamental member of society. If any one is deceived by them it is largely his own fault, as sufficient light has been thrown on this particular subject for some time to protect people against any imposition from this source.

Overproduction of Lawyers.

But, in the case of the technical and agricultural schools, the curse of the education they give should be prefaced by a large D——, for, as I have shown, these institutions are doing an enormous amount of damage. Still, this damage affects the student only, and not the public. When we come to the making of lawyers, however, we strike a branch of higher schooling where the curse should be prefaced by several D——'s, not only on account of the colleges themselves, but because of the results coming from them.

Without going into details, I think it is safe to say that one-half of all the crime, degradation, imposition,

fraud and corruption that we find existing about us to-day is due to the lawyers. It is this class of men who have made wholesale robbery and theft possible, and who have given to these crimes the air of respectability; they are the ones who humbug judges and juries and stretch the laws so that the unscrupulous may impose on the public. In fact, it is the lawyers who stand like a stone wall between the great criminals and the public and enable the rascals to keep out of the penitentiary.

When important criminals are on trial it will be found that double their number of rascally lawyers are endeavoring, by sharp tactics and unscrupulous methods, to free them and thus defeat the ends of justice. These people not only are guilty of an enormous amount of stealing themselves, but are the backbone of all other great thieves.

The overcrowding of the legal profession is the chief cause of the cussedness of this line of education, the number of lawyers produced being so large they are obliged to resort to all sorts of dishonest measures in order to make a living. Probably every business man or manufacturer has learned from his own experience what a curse this class of men is. They will hang around one's place of business to find out when an accident occurs, so that they may secure a case, and should they succeed, they resort to all sorts of sharp practice for the purpose of making trouble.

I have in mind such an instance that occurred in my own business. This case grew out of a trifling matter that from the outset it was apparent we had nothing to do with and were not responsible for, yet the unscrupulous lawyers and idiotic judges kept it in

the courts for ten or twelve years at a cost to us of over $12,000.

Coming now to the subject of this chapter, "Medical Education," I find it difficult to determine which should be prefaced with the greater number of D——'s — the law colleges or the medical schools.

The overcrowding of the medical profession brings about conditions quite similar to those that have just been described in referring to the lawyers; that is, by reason of this overproduction, doctors are obliged to resort to all kinds of trickery, sharp practice and imposition in order to obtain business.

It is difficult to estimate the amount of damage thus caused, but doubtless it is very great. Many times doctors will make well people ill, or, when already ill, will prolong their illness, or will perform unnecessary operations.

Facts Regarding This Matter from a Reliable Source.

I have been fortunate in finding a paper delivered twenty-five years ago by one of our leading physicians before the Alumni Association of the Chicago Medical College. As this makes out my case as I anticipated when I decided to take up this subject, and therefore relieves me from the necessity of making an investigation myself, I quote from it as follows:

> Gentlemen,— Before announcing the topic of my address to-night, I will state that I recognize the fact that at our annual meetings, occurring, as they do, on the commencement day of our college, it is customary to make the professional outlook as cheerful and bright as possible; to picture in glowing colors the noble and heroic life of the physician, and to dwell with emphasis on the fact that

there is always "room at the top." Therefore, in deviating to-night from the usual course pursued, and, instead, presenting a few sober facts to your consideration, I trust you will find a sufficient explanation in the urgent necessity, the duty we owe to each other, to thoroughly discuss the dangers of the hour, embraced in my theme to-night: The overcrowding of the profession, its causes, effects, and the remedies to be applied.

The curse of the profession to-day is a multiplicity of medical colleges, most of which are of an inferior type, veritable *diploma mills*. In the United States, with a population of fifty millions, we have twice as many medical schools as exist in all the following countries combined, namely: The German Empire, the Austrian Empire, the Russian Empire, Great Britain, France, Sweden and Norway, representing a population of three hundred millions. In Chicago *alone* we have more medical schools than may be found in the whole Austro-Hungarian Empire, and we graduate in this city this year more physicians than are annually licensed to practice in the whole German Empire with a population of forty-five millions. Think of it, gentlemen! It ought to make our cheeks tingle with shame, for the existence of such facts constitutes a national dishonor, reflects discredit upon every American physician, and justly makes us the laughingstock of the whole civilized world.

Consider for a moment the origin of the average medical school in this State. Any five physicians, actuated by an intense desire to increase a limited practice, can club together, forward $4.50 to the Secretary of State, receive by return mail the necessary charter, and another medical college is organized. What is true of this State is true of every other State in the Union, and thus it happens that we see medical colleges springing up everywhere, in cities, villages and out-of-the-way places, without any reference to the needs of the profession or for the sake of the communities, but simply for the purpose of giving the "organizers" an unfair advantage over their competitors in the practice of medicine. The average medical college, then, is nothing but an advertisement scheme to enrich the

few at the expense of many. It enables the physician, utterly unknown outside the circle of a limited practice and his immediate relatives, to suddenly blossom forth as a professor of the principles and practice of medicine or of surgery; it enables him to adorn his letter-heads with the seductive title, and gives him an opportunity to explain to the unsophisticated patient any absence from home by the statement that he was lecturing at the college. It enables him to advertise in various and many ways, and at the same time not conflict with the code of ethics. No wonder, then, that in Chicago alone we have over one hundred and fifty professors and lecturers on medicine, or about one professor to every six physicians, although even this low ratio is constantly diminishing, so that in time the physician who is nothing but a plain M.D. will be indeed a rarity — a startling curiosity.

Consider, again, the course of instruction in vogue in nearly all of our medical colleges. Two courses of lectures, of from four to five months' duration, in each course the same lectures repeated, transform the medical student, whether fresh from college, from a store, or from the farm, into an M.D., with all the rights and privileges pertaining to that degree. Well may the learned and eloquent Professor Pepper, of Philadelphia, in a most admirable essay on higher medical education, exclaim, "Can it be that the apprentice must practice five years before he is regarded as a skilled workman, fitted to mend or make rude machines of iron or brass, and that in this land of intelligence and common sense one who has studied medicine less than one-third that time may have his license to meddle with and make or mar that most wonderful machine — man's body — infinitely complex, gifted with boundless capacities, and freighted with the awful responsibility of an immortal soul?" . . . But, alas! so it is, and, as Professor Pepper is my authority in stating that the vast majority of American medical students receive the degree in medicine without ever having felt a sick man's pulse or listened to the sounds of the lungs or heart, I question *which* is the *greatest* public calamity, an occasional epidemic of cholera, or the regular recurring

annual epidemic of some four thousand doctors let loose on an innocent and unsuspecting public?

Compare, but for one moment, the system of medical education in force in all other civilized countries. Take Germany, for example, which is a fair type of them all, although in several of the other countries the course is even longer than there. But one comparison will suffice for our purpose. To matriculate in any German university the medical student must pass a preliminary examination in Latin, Greek, German, history, mathematics, and the elements of natural science. The course of lectures extends over four years, nine and one-half months in each year, and is as follows:

	Number of hours weekly.
Chemistry	6 for 1 year
Physics	4 for 1 year
Zoölogy and Comparative Anatomy	3 for 1 year
Botany	3 for 1 year
Mineralogy and Geology	2 for 1 year
Anatomy, Histology and Preparation of Specimens	10 for 1 year
Physiology, with work in Laboratory	8 for 1 year
General Pathology, Pathological Anatomy, with practical work	6 for 1 year
Pharmacology, Toxicology, Prescription Writing	2 for 1 year
Special Pathology, Medical Clinics, Course on Physical Diagnosis	10 for 2 years
General and Special Surgery, Clinics, Bandaging, Operating	5 for 2 years
Obstetrics and Gynæcology, Clinics	3 for 1 year
Eye and Ear Clinics, use of Ophthalmoscope, Operations	4 for 1 year
Forensic Medicine	2 for 1 year

Examinations are held at the end of the second year (*tentamen physicum*) upon anatomy, physiology, chemistry, physics, botany, zoölogy and mineralogy, and at the end of the fourth year, upon the remaining subjects of the course. This latter examination precedes more or less closely (according to the proficiency of the candidate) the final examination, which is conducted by the faculty, each professor examining the candidate in his own department. After passing the examination and presenting a printed thesis, he receives the degree of doctor of medicine. This degree, however, does not entitle him to practice, and he has still to pass another examination before a State board of examiners. This examination is divided into five sections, and includes, besides a theoretical examination, the preparation and demonstration of specimens of the osseous, vascular and nervous systems; the demonstration of an autopsy and a practical examination in medicine, obstetrics and gynæcology, physiology and microscopy. As showing the severity with which the State examinations are conducted, it may be stated that, on an average, twenty-five per cent of the graduates fail.

Who are the teachers? Four dollars and fifty cents does not constitute a professorship in German universities. Those temples of science are occupied by men whose names appear in every text-book of medicine and are familiar to every student and physician, first as lecturers, then by reason of original work and popularity promoted to the position of so-called extraordinary professors, and finally, when known as *authorities,* promoted to the high positions of ordinary professors, they occupy the loftiest stations in public esteem and admiration, and their honored names endure forever.

From the fact that we have more medical schools than can be found in the rest of the whole world, it naturally follows that we have also a greater proportion of physicians to the population than exists in any other country. According to the census of 1880, in a population of fifty millions we had 85,761 physicians, or one physician to every 585 persons.

In France, the proportion is one physician to every 2,000 persons.

In Austria, one to every 2,500 persons.

In Germany, one to every 3,000 persons.

In Italy, one to every 3,500 persons.

In Sweden, one to every 7,500 persons.

And so on.

Permit me to again quote Professor Pepper: . . . "The profession at large are awakening to the fact that its ranks have been fearfully overstocked by the selfishness of the medical schools, and I make bold to assert, well knowing the unparalleled depression of all business interests, that there are but few classes of the community of which a larger proportion are *not* earning a living than of the medical profession."

One of the most prominent physicians in New York city, who has given a great deal of thought and attention to the matter under consideration, states his opinion thus: "In reality, to-day, a young man without money or influence, whatever his talents, address or attainments, and however exceptionally equipped for his work, has less prospect of success, starting in the world as a physician, than in any other department of intellectual activity. Energy might avail him in business, but not in medicine, and the more energetic he is, the more it will gall him to wait for patients that never come, and starve while they are coming. I could tell you the subsequent history of many promising graduates, such tales of broken hearts, blighted ambition, disappointed hopes and wrecked lives, from no fault of their own, only because there are three doctors where only one is needed. And *this* is the pass to which our present system of medical education has brought a once noble profession." The Boston *Medical Journal* — the most conservative medical journal in the United States — has the following editorial in a recent number: "The swarms of young men that are about to invade the numerous medical schools might well pause before setting forth on this so perilous career. Such deliberation is especially proper on the part of those who contemplate exercising the profession as a livelihood, and

who possess no resources on which to fall back for a series of years during the waiting for patients. There may be room in the upper story, but there is no lack of eager, hungry, able competitors for the vacant space that is there."

But, gentlemen, what use is there in quoting the opinions of others? There is not an alumnus present to-night who can not confirm all that has been said, from his own personal experience and observation.

The action of our diploma mills, in adding each year thousands of young men to the ranks of a profession already filled and overflowing, is rapidly producing an army of genteel paupers, too proud to beg, too honest to steal, but too poor to exist.

My remarks, gentlemen, are not dictated by any bitter feeling. My own lines have fallen in pleasant places. But it is the knowledge of the truth which I assert, the result of personal investigation, the acquaintance with many in the profession, who, though brilliantly endowed, are struggling for a mere pittance by reason of the terrible competition; the tales of poverty, debt and misfortune which it has been my lot to be obliged to listen to — it is for these reasons, gentlemen, that I protest against this infamous system of medical education in this country; this starting of medical colleges where none are needed; multiplying them where there are already far more than are required; creating more free dispensaries to diminish still further the scant field in which the young physician has to find an existence. Against these abuses I protest, and ask your coöperation in endeavoring to stem the tide which is sweeping us down to a still lower plane of professional strife and degradation. What, then, is the remedy? No reform can be expected from the colleges, for obvious reasons; for, managed as they are, as private enterprises for business purposes solely, they naturally resist anything calculated to impair the very object for which they exist. As, in a free country like ours, it is unfortunately impossible to cause the "professors" to be imprisoned at hard labor and the colleges to be burned down — we have to seek elsewhere for relief. The indi-

vidual physician can do nothing, but, as in unity lies strength, so with us, if we will only coöperate, much can be accomplished.

I am told by good authority that, although since the foregoing paper was written there has been a decided improvement in the medical education furnished by the best colleges, the abuses of the unscrupulous medical schools are fully as bad to-day as then. Also that the overproduction of doctors is fully as great at the present time, for, while their number is diminished by death and other causes at the rate of about twenty-five hundred a year, the colleges are turning out from five thousand to six thousand new doctors each year to take their places.

In the address quoted the writer referred to the doctors who establish these medical colleges as being young and inexperienced, and, in some cases, bordering on what might be called "sharks," and I wish to say that I happen to know this is not always the case. At the time that address was delivered the Rush Medical College, of Chicago, and the Chicago Medical College, probably were two of the meanest and most low-down examples of such institutions that ever existed, and, as I have already mentioned on page 132, they were run by some of the very best physicians in the city. When doctors of the highest standing are found conducting such "mills" as these, what can be expected of the lower grade of physicians?

It is a question with me whether the community would not be better off if we could go back to the old-time method of making doctors, under which they first served a sort of apprenticeship with some good doctor, and then went to a medical school for a few years.

There has been much talk in recent years about the fraud and swindling resorted to by some of our high-grade doctors, which also may be said of some lawyers. They seem to act on the theory that the charge for their services ought to be based on the wealth of their patient, or client; but how they justify the charging of a fifty-thousand-dollar fee in a five-hundred-dollar case is incomprehensible to me, and I claim it is nothing less than highway robbery.

If a bricklayer who was willing to work for a poor man for $4 a day should demand $100 a day when working for a rich doctor or lawyer, I am sure they would at once class him among the highway robbers.

As showing to what ridiculous extremes this country has gone in the matter of medical colleges, I quote the following from a recent publication:

> A list of medical colleges of all foreign countries shows a total of 165 such colleges outside the United States, while this country alone has 144. In other words, of the 309 medical colleges in all countries, the United States has 144, or forty-seven per cent, while the thirty other nations altogether have only 165, or fifty-three per cent.
>
> All European medical schools are medical faculties of universities or are under the direct control of universities, and there are no proprietary schools such as predominate in this country.

One of the most conclusive evidences of the overproduction of doctors, I think, is the fact, as reported to me by a prominent physician, that the yearly income of all doctors in this country averages about $600.

The overcrowding of the medical profession also leads to an immense amount of abuse in connection with the hospitals, but I shall not undertake here to go into the details of this feature of the subject, as it already is well understood, and would make this article too long.

CHAPTER VI.

SCIENTIFIC EDUCATION — IS IT IMPORTANT IN THE PRODUCTION OF SCIENTIFIC OR PHENOMENAL DISCOVERIES OR INVENTIONS?

Having disposed of the subject of classical, business, technical and medical education, to *my* entire satisfaction, I will now see what I can do to knock out scientific education, and, in a subsequent chapter, will knock out agricultural education.

In my papers on technical education there has been more or less mention of scientific matters in their direct relation to manufacturing, construction, etc., and where discoveries and inventions of a scientific character grew mainly out of a necessity for them.

For the sake of convenience I classify discoveries and inventions as follows: Scientific or phenomenal, ordinary or adapted. Ordinary inventions and adapted inventions I have considered in previous articles; and before leaving this discussion on educational matters, I wish to glance briefly at the first class.

My reason for doing this is the existence of a belief among nonthinking persons that most of what may be called our phenomenal inventions — the inventions closely allied to scientific discoveries — have come wholly from scientists, and that this belief is coupled with the conviction that none but a scientific person could make one of these inventions. The some-

what popular idea is that, to get scientific results, schools of science are an absolute necessity, and the object of this paper is to ascertain to what extent that is true.

Unjust toward Practical Men.

I maintain that this is a mistaken idea, which is responsible for a great deal of confusion and injustice toward the practical man and for a wholly unwarranted conception of the importance of the scientific man.

So far as benefiting humanity is concerned, only applied science, or knowledge, is of value. No matter how much science the schools may teach, or how much science is developed through their teaching, its value must be measured by the amount of it that is used for the good of humanity.

The history of the world gives abundant proof that science in itself has been of little use save where it has made a close alliance with practice. It is the practical man — and in the majority of instances the man without scientific education — who is to be credited with the great bulk of our inventions, not only the adapted and ordinary, but also the phenomenal.

It has been well said that "necessity is the mother of invention." The need for something never yet in use has brought forward the great majority of inventors. But there are other inventions and discoveries which did not grow out of what might be called an apparent necessity.

The chemical composition of water was such a discovery, the telephone and the talking machine were such inventions.

A Puzzling Question.

The puzzling question is how to account for a man making such a scientific discovery or such phenomenal inventions? Does a scientific education lead a man to think that something which appears to be impossible or improbable can be done? If not, what is there in a man's mind that leads him to do a thing of this nature?

How did Franklin conceive the idea that he could draw electricity from the clouds? Why did Morse believe he could send this same force along a wire as a means of communication? What gave Gray and Bell the idea that the human voice, capable of being heard ordinarily only a few hundred feet, could be sent by wire for hundreds of miles? What gave Edison his conception of the incandescent lamp and of the talking machine, and Marconi the idea of wireless telegraphy? Why did Field fancy he could send speech under the ocean? What suggested to Watt that water is a compound and not an elementary substance? What led Welte and Bockisch to make the wonderful discovery that a mechanical piano-player could be made that would reproduce the exact characteristics of the pianist?

These are but a few examples out of many that might be mentioned to show that the practical man should be given credit for at least a very large percentage of all the discoveries and inventions of a scientific nature that have increased the comfort, happiness and profit of mankind.

Here are a number of the most phenomenal discoveries and inventions the world has seen, but it is doubtful if any of these men stand preëminent as scientists.

Those who did these extraordinary things are in a class far above the ordinary inventors, men in practical lines of work. Yet they are inventors, not scientists, practical men rather than theorists. It is their practical work that has benefited the world.

It being a fact, as already stated, that science has but little to show in matters pertaining to the welfare of mankind, why do so many persons doff their hats in homage to the scientific schools and the scientists and overlook the substantial claims of those who have applied their inventions and knowledge to useful and practical ends?

It is simply another case of the unthinking being dazzled by the glamour of the colleges. To them the word " scientist " has a subtle and mysterious meaning, and they can not understand how any one not scientifically trained in some school could possibly get on speaking terms with the hidden things of nature.

What History Shows.

A cure for this unreasonable and false attitude would be a short study of the world's progress. For such a study would show that most of the basic things of modern science were discovered or theoretically worked out long before our schools of science and scientific courses came into being; that practical men — often unschooled men — laid, broad and firm, the foundation for all that these schools can teach to-day.

In this and all the preceding articles I have written on education my chief purpose has been to show the falsity of the claims for all kinds of higher schooling and to do justice and give credit where it belongs.

I believe I have been conservative in asserting that at least ninety per cent of all that goes to make life

worth living we owe to the mechanic and the inventor; and I doubt if the higher educators can show that they have much claim even to a part of the remaining ten per cent.

The Research Fad.

I can not leave this subject of education without taking some notice of the "research" fad. While this is not strictly speaking education, it is closely allied to educational institutions, and I consider it the acme of all the great hobbies of the higher educators. The great idea in this whole matter seems to be to have some research work connected with these institutions, in order to bolster them up and give some excuse for their existence.

Technical education has a certain fascination; scientific education draws and dazzles even more strongly; but neither of these can be compared with the great and wonderful things promised under the glittering title of "Research."

There is no end to the subjects which the research dreamer goes into to satisfy his ambition; in fact, I can not conceive of a greater array of things purely idiotic. Of course, I leave out of the list such useful work as medical research, work that promises something worth while to human kind. What I have in mind is the man who has the astronomy microbe; the one afflicted with the meteorite bacillus; the victim of the north-pole mania; the fellow with the flying-machine bug; and the person attacked by the archeological germ.

These enthusiasts are willing and ready to spend hundreds of thousands of other people's money on these and similar senseless things, when the chances are

not one in a thousand of anything being discovered of value to mankind, and the probability is that this one discovery will cost a thousand times more than it is worth.

Their search usually is like looking for a needle in a haystack; and too often their success is akin to that of the mountain which, after much labor, brought forth a mouse.

One specimen of this research fad and its lack of value is found in the awarding, in 1907, of the Nobel prize for Physics (amounting, I believe, to $40,000) to Prof. Albert A. Michelson " for his optical instruments of precision and for his investigations made therewith in spectroscopy and in the science of measurement."

I have not heard of any results coming from this discovery and can not imagine how anything could be gained from it, as the whole idea as to its value was based on a false theory. While it may have been a nice piece of scientific discovery, I think it is a striking example of the scientific man drawing upon his imagination as to the value of his work.

This case also proves that the men having charge of the making of these awards, who were selected by the Swedish Academy of Science, are persons whose judgment in such matters can not be depended upon, for had they possessed any common sense they never would have granted an award for such a discovery. This is another blunder of the highly schooled class of men.

CHAPTER VII.

THE PENNSYLVANIA RAILROAD COMPANY AND TECHNICAL-SCHOOL GRADUATES.

One of the worst sinners in encouraging technical schools is the Pennsylvania Railroad. While it is not as great a sinner as the General Electric Company or the Westinghouse Company, still it is bad and deserves to be mentioned here.

This railroad company frequently is quoted as having such a wonderful system for making its own help out of college men and is such a great believer that this system has much to do with promoting the loyalty and good will of its men and the success of its road, and it also has so much to say about its wonderful organization and its superiority over any other road in the country, that it may be of interest to the public to see what all of this talk amounts to.

The stockholders of this road have a perfect right to run the road with technically educated men, even if no one in the United States agrees with them, and it is no one else's business. And if they choose to run an asylum for half-baked engineers — as I have referred to in Chapter III — that also is their own affair. But when the officials of the road go out into the lecture field and take most decided grounds that their road is run better than other roads, and that this is due to their employing technically educated men, and that this class of men are in demand generally by manu-

facturers, the management of this road becomes a matter of public interest, and it is right and proper to raise the question as to whether their judgment is infallible and every one else is wrong.

Only One Opinion in Fifty.

It is strange that men should be so sure of their position on this subject when they have no evidence to support it, and especially when their opinion is only that of one in twenty or one in fifty among men in the same line of business. They do not seem to be able to see that, while the Pennsylvania Road, as they claim (without warrant as I shall show further on), has been run largely by technically trained men, other roads have been run just as well without such men.

Some time ago an article by Mr. Samuel Church, a secretary of this road, appeared in *The Yale News,* in which he said:

"There is no longer any question in regard to the superior availability of a college-bred man for promotion to the higher positions in industrial establishments."

He goes on in a gushing way about the great importance of technical and higher education generally, and, as another example of his style, I quote the following:

"The engineer who has been trained to study the statues of ancient Greece will build a better bridge than the man who can not describe the Parthenon frieze."

Perhaps it was a man of this class who planned the Blackwell's Island bridge or the ill-fated bridge over the St. Lawrence River, near Quebec?

A Few Pointed Questions.

In order to ascertain whether Mr. Church had the experience to justify his claims, I wrote to him and asked him the following questions:

1. How many years have you had experience with men who have had a technical-school education?

2. How many technical-school educated men have been under your immediate charge and had close attention from you?

3. (a) Have you ever given close attention to the brighter class of young men with your company who did not go to college? (b) If so, did you notice in them any shortcomings that would appear to give the college-educated man an advantage over them?

In order to get at the real merits of this question it seems to me it is necessary to imagine a case something like this:

Take two boys of equal natural ability and just through with grammar school. Let one go on through four years of high school and then four years at college. Let the other put in these eight years learning the railroad business, dividing the time up as follows: 3 years in machine-shop, 2 months in car-building shop, 2 in foundry, 2 in pattern-shop, 2 in blacksmith-shop, 3 in firing on locomotive, 2 with track repairer, 9 surveying, laying tracks, grading, etc., 3 in testing department, 6 in purchasing department, 3 at smaller country stations, 3 at a large freight station, 3 in passenger department, 6 in auditing and bookkeeping departments, 2 in train despatcher's office, 12 in division superintendent's office.

While in the department last mentioned (the division superintendent's office) he would look into all kinds of accidents, landslides, washouts, snow blockades, wrecks, etc., in other words, get a clear insight into all the difficulties which a division superintendent has to contend with.

4. Do you claim that the boy who spent the eight years in high school and college will be more useful and

valuable to you in your railroad business than the one who follows the other course I have mentioned?

Mr. Church's answer is too long to publish in full, and in any event almost all of it is not pertinent to the matter in question, for, while he has been with the Pennsylvania Road for some thirty-four years, his time was largely spent in the office of superintendent of transportation and as assistant secretary and in other office positions.

Railroad Men Quickly Made.

Therefore, he might have answered my questions by stating that he had had no experience with either technically educated or practical men in the lines where these men are used, and consequently knew nothing about the subject, which, of course, would have ended the discussion.

Another example of his ignorance on this subject is shown in the following remark in his article already referred to: "On the railroad we want a man in the shops who can not only take an engine to pieces, that being his analytical power, but who can also construct it when its parts are first assembled."

Now let us see what qualifications the college man has for this job.

In the Pennsylvania Company's system for making important help for its motive power department, it takes college men and puts them through the following apprenticeship course for four years:

Erecting-shop, 6 months; machine-shop, 6; vise-shop, 3; air-brake shop, 2; blacksmith-shop, 2; iron-foundry, 2; boiler-shop, 2; car-shop, 6; roundhouse, 4; firing locomotive on road, 3; shop clerk's office, 2;

motive power clerk's office, 2; drawing-room, 3; test department, 5.

Small Amount of Experience.

From this it will be seen that the apprentices spend about fifteen months in the machine line, and this is all the experience these college men have to qualify them to put a locomotive together.

It is a most surprising thing that Mr. Church can not see the stupidity and absurdity of his claim that the college man with this fifteen months' experience is superior to the practical man who has had many years' experience. Also, that thousands of engines have been put together by the practical man for every one that has been put together by one of these college men who is trained accordingly to the company's method.

If the facts were known, I do not doubt we would find that not one of the Pennsylvania's apprentices ever had or could put a locomotive together.

These college men do not possess one-tenth the mechanical skill and knowledge required to perform this work, and yet Mr. Church undertakes to humbug the public into believing that these men are superior for this job.

He also says practically the same thing about work on air brakes and valves, and his position in this regard is just as absurd as on the subject of the locomotive.

As before stated, Mr. Church has never had anything to do in the practical line, being simply an office man; and yet he has the impertinence practically to go out lecturing and advising as to the advantages of a technical education. What the Pennsylvania Road should do is to put a collar around his neck and chain him to a desk.

Incompetent Advisors.

This is simply another specimen of the people who do not know anything about the subject going before the public and advising young men to spend five or ten thousand dollars and eight of the best years of their lives to get an education, when they have not a particle of evidence on which to base their judgment.

In an article that appeared in one of the magazines a statement was made that the young man, upon completing this four years' apprenticeship course of the Pennsylvania, " is at once assigned to important work."

In order to get further information on this subject, I wrote to the Pennsylvania Road and asked it to give me a list of the important positions that it considers these young men capable of filling upon completing this four-years' course. In response I received a long letter from the fifth vice-president, Mr. W. W. Atterbury.

From Mr. Atterbury's letter it appears that these young men, upon completing their apprenticeship course, are generally appointed first as inspectors and assigned to some shop or mechanical road official.

Next, they are appointed to the position of assistant roundhouse foreman or assistant master mechanic.

Next, general foreman of a small shop.

Next, to the position of master mechanic of one of the smaller shops, gradually being shifted to the more important shops.

Next, to the position of superintendent of motive power.

Insufficient Training.

Now let us see how this training has qualified these young men for these various positions. As to the first appointment, that of inspector, they simply have had

four years in the shop as already referred to, and as only a small part of the great variety of material required by the company is used in these departments, they would have but little opportunity to acquire a knowledge of these materials and would know absolutely nothing about the enormous variety of materials that this road is continually buying. To acquire a thorough knowledge of all this work would be a long and laborious undertaking, requiring years.

With regard to the position of assistant roundhouse foreman, the young men's experience has given them but the merest trifling qualifications for this work. The chief thing required of a roundhouse foreman is to know how to make the small repairs that can be attended to there and also to know when an engine is fit to go out on the road, or when it is so badly out of order that it ought to be sent to the repair-shop for thorough overhauling.

It, of course, is a serious mistake to send a locomotive to the repair-shop for this purpose, as I should guess it would probably cost a thousand dollars to overhaul it. It will be seen that if an engine is sent twice to be overhauled, when once would answer the purpose fairly well, this would mean a thousand dollars thrown away.

Requirements for Roundhouse.

To determine just when this trip to the repair-shop should be made requires a large amount of experience as an engineer, and also as a machinist.

Men in this position also should be able to judge of the efficiency and competency of the running engineers from the condition in which they bring in their engines from their various runs. To do this accurately and

fairly requires an amount of experience in actual operation that never could be secured in three months of firing on a locomotive.

The nearest these young men come to getting any education along this line is during fifteen months they spend in machine work and the three months they have in firing on a locomotive, which is but a small amount of experience.

I venture the opinion that there is not one man doing repairs under such a foreman who doesn't know ten times as much about the work as his boss. This is reversing the order on which every one else does business; that is, the foreman usually is selected because he knows more than the men under him, and because of his common sense and ability to handle men.

With regard to the other positions that he may be given afterward, such as assistant master mechanic, general foreman of a small shop, master mechanic of various shops, and superintendent of motive power, the young man has simply had about fifteen months in the machine-shop directly to qualify him for these positions and in addition has had a little more than two years in clerical work and various other lines that have a slight bearing on the subject, making four years altogether.

Qualifications Not Common.

The fact of the matter is, that the young man has not the necessary amount of experience, and without this he is worth nothing in these lines. Then, in addition to experience, he should have a large amount of good common sense and also know how to handle men, qualifications that are rare.

There is not one in a hundred among these men who has the tact and other qualifications necessary to fit him for this business, even if he had the mechanical skill.

I do not hesitate, therefore, to denounce the whole scheme of the Pennsylvania Road as utterly stupid and unbusinesslike. If a person manufacturing something to sell on the market conducted his business in that way he would find himself bankrupt in no time.

Mr. Atterbury specifies a number of positions in which these technical-college men are used and, of course, for these different positions much different kind of training is required. For some of these positions a thorough training in the repair-shop would be all that is necessary.

The Only One to Judge.

But when it comes to the larger places, containing blacksmith-shops, pattern-shops, foundries, boiler-shops, etc., the man to take charge of such a place must have some training in all the different branches there. A person who has not obtained, by experience, the knowledge of how a thing is made can not be in a position to judge whether the work has been done to advantage or not.

The only way to fit young men for such positions is that which I have already laid down in one of my previous articles, and, as it applies equally well to the railroad business, I quote from it as follows:

> I maintain that what is necessary for men to have to be successful in manufacturing is a thorough knowledge of the art, of the kind of machines best adapted to certain purposes, and of how much the machines are capable of producing. These prime essentials are not found in a

course of technology, but in long experience and close observation in the business, and in a thoroughly up-to-date factory.

The man to be at the head of the motive power department has to be made in the same way that I have mentioned in my article regarding the General Electric Company. That is, in preparing material for this position, selection should be made from the brighter class of boys who have shown decided merit and who have been brought in to learn the machine business.

Making the Best Men.

Young men thus chosen should spend four years in the locomotive repair-shop and machine-shop, then be given one year in the foundry, a year in the blacksmith-shop, a year in the boiler-shop, and a year running a locomotive. This would make eight years in all, or the same length of time that the college boy spends in high school and college.

After such a practical course the company would have material from which to select a man of great ability, who not only would have a thorough knowledge of everything connected with the department, but would have been selected because he had brains. Besides, while learning the business this man would have been earning something.

On the other hand, admitting that the college man in time could acquire the mechanical knowledge and experience above mentioned (which, of course, he never would), there is no evidence that he would have the brains necessary to fill this position.

The great thing in the management of a railroad, or any other important business, is to find for a manager of each division of the road a man who not only

knows every feature of the business in his department, but who has coupled with this thoroughly good common sense; and then depend upon him to look after the education and training of the men in his department.

Making Good Help.

The success of any large and complicated business depends almost wholly upon it making its own help, and the men at the head of each important part of the business should be continually looking out to have the right kind of help coming along, so that the company never will be embarrassed for the want of good men.

This is the most important work any superintendent of any division of a railroad can be concerned in, and I would not consider any man a success in any position who does not surround himself with thoroughly good help, so that his division may run equally well if anything should happen to him.

A railroad company can not spend money in any better way than by taking the right kind of men and shifting them around, as I have outlined, where they can get experience that will enable them to fill higher positions.

In regard to the other two divisions which Mr. Atterbury mentions — that is, maintenance of way and conducting transportation — I do not think it is necessary to pursue this matter further, as what I have said about the motive power division applies equally well to them.

Something has been said in some of the newspaper articles with regard to the loyalty of the employees of the Pennsylvania Railroad growing out of the fact that this company makes its own help.

How to Encourage Loyalty.

It seems to me there is a chance for a difference of opinion as to whether the company's method can be called a complete arrangement for making its help. I can not see that bringing a college man into a job where there are a dozen men around him in the shop who can fill the place better than he, is going to promote loyalty. I should think that just the contrary would be the case and that not only would this not promote loyalty, but that it would breed contempt among the men toward the management, for the men can see these blunders.

Nor is this what people generally understand as making your own help. As a matter of fact, the Pennsylvania people appear to think that the colleges are making the help for them to a considerable extent. In other words, there are two ways of making your own help — one being to take men and the other to take boys.

A decided disadvantage that a college-educated man has in going into the shops, as one writer has said: "The man who has gone through the shop from the bottom up knows the strength and weakness of the toilers therein. Their inner lives are to him like an open book; but the man who comes in from the top mixes with an uncongenial element which is never properly understood. This want of fellow-feeling is a source of weakness in the management of men, and is as hurtful to success in business as is the absence of human sympathy. It does not pay to have a man in charge who regards workmen as mere machines, and the man who has shared their difficulties, their triumphs and their pleasures is likely to manage them

better than the man who has not been in real touch with them."

What a Foreman Must Be.

In many kinds of work which workmen are called upon to do there is an opportunity to perform only half a day's work without the employer being aware of it, and this certainly is apt to be the case where the foreman is not in sympathy with his men. In other words, to get the best results out of the men they must be under a man who is in sympathy with them and treats them fairly and in a manly way.

The railroad is particularly subject to the abuse I mention, because there is hardly a department in which the foreman or superintendent can determine what a day's work is or insist on getting it. They must depend upon the good-will, honesty and faithfulness of their workmen.

To maintain loyalty in the railroad business, as in any other business, it is necessary for those occupying important positions to know that the person at the head of the organization has a systematic method of arriving at the merit of every important employee, that he has a record of them in his office, and that they will not be overlooked when the time comes for making promotions. Also, that neither a college man, nor any other man, is going to be brought in to take away their natural rights.

No Science in Railroading.

As I understand it, the Pennsylvania Company does not use college men in its traffic or accounting departments, which would appear to me to be inconsistent. If the college man has any merit at all, he naturally

would be of the greatest value in what might be called the strictly business part of the railroad. It seems to me that here is where he would fit in best.

These people appear to go on the theory that there is some science connected with the motive power department of their road, and for this reason the college man has an advantage for this work. This is perfectly ridiculous, as there is not a particle of science about it. It is nothing but straightforward mechanical work.

I noticed some time ago, also in *The Yale News*, an article by Mr. Thomas DeWitt Cuyler, a director of the Pennsylvania Company, in which he seems to overflow with enthusiasm on the importance of college education for railroad men.

In order to ascertain what experience he has had to qualify him for the grounds taken by him in these extravagant assertions, I wrote him a letter similar to the one sent to Mr. Church, but thus far he has not seen fit to reply, although I asked one of the vice-presidents of this road to urge him to do so. I do not doubt, however, that if he had answered my letter he would have made just as poor a showing as Mr. Church.

Facts Against Fancy.

To cap the climax, an article in one of the newspapers recently stated that out of 160 of the principal officials of the Pennsylvania Road, 150 started at the bottom of the ladder, coming from such positions as rodmen, telegraph operators, station agents, clerks, etc.

Mr. John Edgar Thomson, Mr. Thomas A. Scott and Mr. George B. Roberts have been presidents of

the Pennsylvania Railroad Company, serving in that capacity respectively for 22, 6, and 17 years. Mr. Thomson and Mr. Scott had no technical-school education; Mr. Roberts, who was president for seventeen years, was a technical-school graduate.

Thus for twenty-eight out of the forty-five years that these men controlled the affairs of this company, the colleges can claim no credit for any part of their success.

And I have it on the highest authority that the two first named were looked upon as men of very great ability, playing a large part, in different ways, in the development of the Pennsylvania Railroad system.

It would seem from the foregoing that the Pennsylvania lines have been managed by about ten per cent of technical-school men, and ninety per cent of non-technical-school men who grew up in the business. Doubtless, this accounts for the company's success.

In summing up this matter, it is surprising that the Pennsylvania people are so confident that they can not get a good man for their road unless he has a college education, in view of the fact that they stand almost alone on this subject, and also that this country has produced many of the strongest and most thorough-going men in the railroad line who ever lived, nearly all of whom had not a college education and in many cases but a small amount of general education.

Among these we find such men as Van Horn, O'Shaughnessy, Hughitt, Harriman, Huntington, Hill, Ripley, Winchell, Harris, Earling, and dozens of others that might be named.

Some of these, notably Mr. Hill, Mr. Harriman and Mr. Huntington, also were without any railroad training when they went into this line of business, and

never had made a conspicuous success in the line of business they had followed previously.

If such men can start in at middle life, without previous experience, and pick up the railroad business and make a success of it, surely it can not be an intricate business; and I can not understand why any one should claim that a man to be successful in it must have a college education.

A Practical Suggestion.

The following is taken from the second edition of Part One of this book. It applies especially to such conditions as I have mentioned in connection with the Pennsylvania Railroad Company:

A number of years ago there lived in Chicago Mr. Allen C. Lewis, who, from what he had seen of manual training and technical schools during his travels abroad, had formed the opinion that these institutions possessed some merit, and he therefore decided to leave his large fortune for the establishment of a school of some such general character. It was found, upon his death, that he had left to trustees in Chicago a sum which was to be used for that purpose when it had accumulated to a certain figure.

When that time arrived, the trustees, not feeling certain what would be the best kind of a school, and wishing to make no mistake in a matter of such importance, invited a large number of prominent men in that city to a dinner for the purpose of discussing the subject. Some time after that meeting it occurred to me that it might be a good idea to establish a school for the training of men for railroad work, and I spoke of it to several prominent railroad men; but, although they talked as though they thought it might be a good

thing, no enthusiasm whatever was shown about it. I even wrote to the trustees and suggested the establishment of such a school, but the idea was not adopted.

Now, in view of the high opinion which many railroad men seem to hold concerning a college education (as shown by their answers to my inquiry, and by their letters referred to by President Thwing, of Adelbert College, in his articles which appeared in several publications a few years ago), does it not seem strange that it has never occurred to any of them to establish such a school as I have just mentioned, or even to suggest such a course to some of the colleges?* This is especially remarkable, when it must have come to their notice that many of our schools and colleges have discovered that the kind of education they have been offering in the past has not been along sufficiently practical lines, and are now anxiously looking for suggestions that will make their course of study more practical.

Letters from President Thwing.

As a glaring example of the wholesale deception that has developed in connection with my investigation of this subject, I will refer again to the correspondence that I had some years ago with Charles F. Thwing, president of Adelbert College, Cleveland.

In several articles published by him he mentioned the fact that he had corresponded with the heads of a hundred prominent railroads in this country with regard to the value of college education for young men who enter the railway business. As he claimed

* Since this was written I understand several universities — notably that of Illinois — have added courses in railroading.

that "the general and strong tone of all the answers was that the boy should be educated, and that the college represented the fitting means, methods and condition for giving him an education," I wrote him several times, asking whether he could give me the names of a few that he was certain were acting upon that theory in their business.

All the information I was able to secure from him is a letter in which he mentions the names of four railroad presidents who he thinks are honest in this matter, but he says he may be mistaken about even these, as he could not find their letters. There is no doubt in my mind that, if President Thwing had investigated this matter more thoroughly, he would have found that not one among the entire one hundred railroad managers with whom he corresponded actually gave any preference whatever to men who had received a college education.

CHAPTER VIII.

CARNEGIE AND TECHNICAL SCHOOLS.

At this point I can imagine some one asking: Why do such men as Carnegie put millions into technological schools when their own millions come chiefly through the aid of nontechnical-school but practical men?

By the way, I feel that I must point out here what I consider the glaring inconsistency between what Mr. Carnegie says and what he does, because so many look upon him as a wise man, and as having had such a wide practical experience in mechanics that his opinions carry considerable weight.

I quote briefly from his book, "The Empire of Business," published no longer than seven years ago. In the chapter on "How to Win Fortune," after giving a long list of the best known industrial establishments in several lines in this country, Mr. Carnegie says:

> Every one of these great works was founded and managed by mechanics — men who served their apprenticeship. The list could be greatly extended, and if we were to include those which were credited as men who entered life as office boys or clerks, we should embrace almost every famous manufacturing concern in the country.

Further on, in considering successes in mercantile, commercial and financial enterprises, Mr. Carnegie makes this significant comment:

> The absence of the college graduate in this list should be deeply weighed. I have inquired and searched everywhere in all quarters, but find small trace of him as a leader in affairs.

And a few lines farther:

> But the almost total absence of the graduate from high positions in the business world seems to justify the conclusion that college education as it now exists seems almost fatal to success in that domain.

Those Who Win.

Turn a page or two and we find the assertion:

> It is the poor clerk and the working mechanic who finally rule in every branch of affairs, without capital, without family influence, and without college education.

Now, after all these illustrations, based on his own experience and observation, in favor of the practical man against the technical man, or college graduate, Mr. Carnegie enters the field of pure speculation, and says that technically trained men are open-minded and free from prejudice.

He has nothing whatever upon which to base his assertion. He simply goes into this to add to his glory and founds a $12,000,000 technological institution.

If he had taken that $12,000,000 and added another $12,000,000 to it, and dumped the whole amount into the ocean, this country would be better off.

Mr. Carnegie has argued that it is a good thing that he should have so much money, because he can use it for the benefit of the public. Is it benefiting the public to put $12,000,000 into his technological institute, to turn out a class of young men destined, according to his own unequivocal assertion, to be dis-

tanced in the business race by "the poor clerk and the working mechanic"?

I leave it to the reader if Mr. Carnegie has taken the course a sound business man would follow. If I had the naming of his institute I should call it, "Carnegie's Twelve-million Dollar Blunder."

It will be seen, as Mr. Carnegie says, that there were no technically educated men when he started in business, and he does not claim to have had any since. He was not man enough to come out and say so in his answer.

Not only this, but he himself states that it is the mechanic who has done everything in promoting manufacturing in this country, and the college man has not even been a success in business. After putting himself on record this way, I can not understand why Mr. Carnegie should all at once go over to the other side.

A Letter from Andrew Carnegie.

When I was preparing to write the foregoing I addressed a letter to Mr. Carnegie, telling him of my purpose and asking him to answer the following specific questions:

1. Do you owe your success in business to any considerable extent to technically educated mechanics in your employ?

2. If so, what proportion is due to this class of men in your employ and what proportion to mechanics who were not technically educated?

3. If you do not owe any of your success to technically educated men, why do you establish a college to educate such men?

4. In your experience, aside from your own business, have you observed that technically educated men are more successful than those who are not so educated?

In answer I received the following letter:

NEW YORK, December 20, 1907.

MY DEAR MR. CRANE,— I have little time to devote to the defense of technical education. I do not think it needs any. It is speaking for itself and will speak for itself, and even you will be satisfied by-and-by that we are on the right path.

You ask me four questions: To the first I answer that when I started business I did not know of one technically educated mechanic, but several families in Pittsburg were sending their young men to Troy and especially to Boston. One of them happened to be a relative and he has made a great success, and is a partner now in one of the leading firms for special steels. I do not believe he would have achieved this so rapidly if it had not been for his superior education. If I were in business to-day, the young man I should take into my service would be the most highly educated mechanic.

This answers all your four questions and I should like to ask you one question in return. The apprenticeship system is a thing of the past; what do you propose as a substitute? The best one and the one better than the original is to give instructions to young men in technical schools. I asked two high authorities how they would answer your questions and beg to enclose their replies, which please return.

Hoping all of this will be of use to you and with kind greetings of the season, I am,

Always your friend,

ANDREW CARNEGIE.

It will be seen that Mr. Carnegie does not answer my questions. He refers to the first one, but in no adequate sense does he give it an answer, and he ignores the other three entirely.

There were no technically educated mechanics when he started in business, but he knows of one young man who received some technical education and afterward

achieved success in the steel business. Surely one success is not enough to warrant his present position on technical education.

And I leave it to the reader if Mr. Carnegie has made out a case for himself or has treated this most important matter as it deserves.

I may add that while Mr. Carnegie has not answered my questions, one of the directors of the Carnegie Technical Schools, who appears to know more about Mr. Carnegie's affairs than he does himself, has made the broad claim that practically all the success that has come to Mr. Carnegie has been due to technical education.

Withholding Credit When Due.

It is clear from the foregoing letter that Mr. Carnegie is withholding the credit he knows to be due to the practical mechanic as a main factor in his own success, and that he adds insult to injury in this particular by permitting Director Hamerschlag, of the Carnegie Technical Schools, to make for those schools and similar institutions such sweeping claims. Mr. Carnegie must know that it is absolutely false that his own success in business has been due in any degree to the influence of formal technical education.

Thus upon injustice to the practical man and false theories as to the treatment of this subject, Mr. Carnegie lays the foundation for justifying his support of technical education. He, in fact, misleads the public, and his course can not fail to do more harm than good.

Mr. Carnegie, instead of answering my questions himself, as stated above, has Mr. Hamerschlag, a director of the Carnegie Technical School, do so.

The shop-trained man performs his work within the radius of his arm; the technically trained man, within the radius of his brain; therefore, technical training of an individual makes him valuable in direct proportion as his education is manifested by results.

I asked Mr. Carnegie: "Do you owe your success in business to any considerable extent to technically educated mechanics?" [Meaning, of course, mechanics graduated from technical schools.]

Mr. Hamerschlag answers for Mr. Carnegie: "Yes, because you [Carnegie] adopted economic processes of manufacturing and labor-saving machines, both of which require trained minds as well as trained hands to perfect and operate."

This infers that Mr. Carnegie had men trained in technical schools for this purpose, which is not true.

Mr. Hamerschlag does not answer this question at all in line with the position I clearly stated. I may admit all that he says without in the slightest departing from my own position.

He uses the term "trained minds" with the evident purpose of giving the impression that the training was done in the schools — although elsewhere in his letter he admits that such mental training can be obtained in the shops. He knows that in the case of Mr. Carnegie the training of both the minds and the hands was done in the shops.

A Lack of Frankness.

Knowing what I meant by "technically educated mechanics," his answer should have been frankly to the effect that Mr. Carnegie does not owe his success to technical training — as given in the schools — but

to the men trained, in both mind and hand, in the shops.

This answer would have been the truth, and would have avoided misunderstanding and confusion.

As a matter of fact, Director Hamerschlag has strengthened my position by admitting, practically, that the shops give both the mental and the manual training necessary to bring noteworthy mechanical success.

The more I reflect on this matter, the more am I convinced that Mr. Carnegie made a grave blunder in not answering my questions himself, from his own knowledge and experience, honestly giving credit where it belongs — not to the technical graduate, but to the practical, shop-trained mechanic.

In closing his letter Mr. Hamerschlag says: "The persistent demand from manufacturers and employers for the graduates of technical and trade schools is marked evidence of the value they place upon the product of these institutions."

Then let us hear from these manufacturers and employers. Let the heads of such industrial institutions as the Baldwin Locomotive Works, the United States Steel Corporation, the National Tube Company, the Cambria Iron Works, the Jones & Laughlin Company, Pratt & Whitney, Brown & Sharpe, Starrett, etc.— who have had enough experience with technical graduates to justify them in drawing conclusions — tell us what has been their experience with technically trained mechanics. Let such men as Mr. Edward Reynolds, formerly at the head of the Allis Works, Milwaukee, testify as to the practical value of the technical graduate in the mechanical department of the industrial field.

If such men as these will say that they have found

the technically trained mechanic — I mean the mechanic who has taken a course in a technical school — to be superior to the practically trained mechanic — that is, the mechanic hand and mind trained in the shops — then, and then only, will we have testimony against my position that is worth listening to.

Foundation of the Matter.

Let us get right down to the foundation of the whole matter. Some of these technical schools have been in operation long enough to show results — that is, to demonstrate whether the boys they turn out make better or more successful mechanics than those trained entirely in the shops.

If these schools think they can give a good account of themselves in this particular, let them do so. Let them show where technically educated men have built up good, solid, competitive businesses of their own, or where they have entered into established businesses and materially helped them — that is, where the technical graduate has done as well as, or better than, the shop-trained mechanic.

This matter of education, in all lines, it seems to me, is promoted by impractical and inexperienced persons, who know little or nothing about the material needs of the people.

For example: Mr. Carnegie does not know — for he had no experience with them — that the technical man has any merit, but he does know — as his own millions constantly tell him — that the practical man *has* merit; yet he says in his haste that the technical school must be a good thing.

I do not know of a sound, practical manufacturer anywhere who favors these schools.

I challenge any technical graduate to mention any idea that he got in his school that he has found he could apply to advantage in the factory.

I do not know of a good, successful, substantial manufacturer who contributes toward the support of technical schools.

Those who do support and seem to favor them are simply men of theories.

After looking over all that has been said both for and against the position taken in my paper, I am more than ever convinced of the soundness of my conclusions, that Mr. Carnegie, and all who are so ardently supporting and favoring technical education, are deceiving the public.

Mr. Carnegie must know that every manufacturer is compelled by competition to look sharp to see that he has the most up-to-date managers and workmen, and every improved tool and device in his shops. He must be thoroughly wide-awake in every respect or he will be doomed to destruction by competition.

If the technical graduate is so essentially the manufacturing success to-day as Mr. Carnegie would have us believe he is, why do we not find manufacturers, alive on every other business point, offering unusual inducements to the technically trained young men and telling us how superior they are to the practical, shop-trained mechanics?

The answer is simple: The manufacturer is not a theorist. He demands results, and he employs the sort of men that can give them.

One Serious Blunder.

From the significant absence of reputable manufacturers who are raising their voices or taking up

their pens in advocacy of technical education, I am led to conclude that Mr. Carnegie made a serious blunder when he failed to specify that one of the conditions of his foundation should be the education of manufacturers in the use of technically educated men.

With the evidence to my mind so clearly against the wisdom of the boy spending his time and his money in getting loaded with mechanical theories that are of no use to him, I can not conclude otherwise than that Mr. Carnegie has put his $12,000,000 to an improper use, because through this move he presents a glittering temptation to the boys of this land to invest money and still more valuable time in an educational scheme that neither Mr. Carnegie nor any one else really believes in.

As a matter of fact, Mr. Carnegie's chief idea in establishing his schools was to immortalize the name of "Carnegie," and, in order thus to perpetuate his name, he calls upon thousands of the youths of this country to sacrifice eight of the best years of their lives and considerable money in acquiring an education which, even when he established his schools, Mr. Carnegie himself roundly and deliberately condemned.

I say to the boys of this country: Don't be misled by the statement of Mr. Carnegie's that if he were in business to-day he would employ only the best educated mechanics.

The fact is, he would have none of these. He would go about his business just as he did when he was in business, for the money he could get out of it. And for this simple reason he would give the

preference now, as he did then, to the practical, shop-trained mechanic; he would not experiment with men he knew nothing about. This statement is only one of Mr. Carnegie's plays to the gallery.

CHAPTER IX.

MANUAL TRAINING IN OUR PUBLIC GRAMMAR SCHOOLS.

No exception is likely to be taken to the general assertion that the fundamental purpose of education is:

(1) To make good citizens.

(2) To make them self-supporting.

As the great bulk of our boys and girls get all of their formal education in the grammar grades, it follows that here should be concentrated our most earnest efforts toward realizing the fundamental purposes of all school training.

For this reason I am a strong advocate of manual training in the grade divisions of the public schools, and do not see much sense in making manual training a feature of our high schools — so long, at least, as there is room for improvement in this direction in the lower grades.

Good citizenship necessarily includes self-support, and self-support is the readiest path to happiness. I think I am safe in saying that the mechanic and the inventor have played a larger share than any other class in giving the world those things that tend toward the advancement of civilization and the production of comfort and happiness.

It also is worthy of note that the vast majority of our mechanics and inventors have gone, and still are

going, into the actual battle of life direct from the grades of our grammar schools.

Real Captains of Industry.

It has been said that man without tools is a "poor, bare, forked animal"; or, as Carlyle puts it, "Without tools he is nothing; with tools he is all." The real captains of industry are found among the mechanics and inventors. Invention has cheapened everything. The inventor and the mechanic made England the industrial marvel of the last century; they are making America the industrial marvel of this century. Therefore, to the turning out of skilful mechanics — which include most of our inventors — we should devote our best energies and our highest intelligence.

Owing to marked changes in our industrial field — the systematizing and classifying of labor, specializing, and the rapid introduction and growth of labor-saving machinery — it is no longer as practical as formerly for the manufacturer to undertake the preliminary training of boys in mechanical lines. But it is essential to the welfare of the country that our boys be so trained, and this training is a proper function of our public schools.

Granted, then, that pupils in the grammar grades should receive manual training, it must follow that this feature should be managed in a thoroughly businesslike manner, that it should be kept free from the evils of impractical or purely theoretical direction.

I am strongly of the opinion that at present all the money a city or a community can afford to spend on manual training should be devoted to the carrying out of this work in the grammar schools; for while

manual training may be of some value to high-school pupils, I maintain that it is not from such that we will get our supply of mechanics, but that the foundation for the making of mechanics and inventors is in teaching practical mechanics to the boys in the grammar grades; for they, naturally, are the ones who will get into mechanical lines after leaving school.

What is needed with us is training in the lower school grades that will tend to make better general mechanics, that is, men who have more practical than theoretical knowledge. The country is very well supplied with the latter class of labor.

Wide Field for the All-around Mechanic.

There is a wide field for the all-around mechanic. Industrial supervision constantly invites him. And the boy who goes from the grammar school to the industrial field with a good general knowledge of the elements of practical mechanics, gained through intelligently directed manual training, is the best equipped for advancement to the higher positions.

As to the cost of manual training: Should the public be taxed for this feature of public educational work? Why not? If it is proper to furnish free instruction above the grammar grades in art, in music, in a dozen other lines commonly called "fads," surely there can be no question as to the wisdom and justice of free and general instruction in manual training in the grammar grades; for such training must be in the line of public economy, as well as highly beneficial to the children; it tends to increase the prosperity of the whole country and to add to the sum of human happiness.

What I have said about manual training for boys

applies equally to girls. It is just as essential to train girls that they may be good homemakers and housekeepers as it is to train boys that they may support both themselves and their homes.

To sum up: Manual training should be a feature of every public grammar school. A generous part of every school day should be devoted to practical instruction in this line. Boys as well as girls should share in it. It should be supported liberally by public taxation. Common sense should be the chief element in its direction.

Manual training makes skilful hands. It is the rational cure for truancy. And if it were more liberally given in the public grammar schools, the need for truant and reform schools would be very greatly lessened. It gives to the ordinary school studies a new and attractive interest. It has a strong influence on morals. It is the best investment the public can make and will return liberal dividends both in the quality and the quantity of our future citizenship.

Manual Training, Distinct from Work in Grammar Grades, is Cousin to Technical Courses.

The manual-training school, as a distinct institution, is cousin to the technical college, and should be criticized and condemned proportionately with it. That is, the separate and distinct manual-training school harms the boy for four years, while the technical school adds four years more.

I consider the manual-training school, detached from elementary education, the most injurious of any schools we have, from the fact that many are led to believe that because this school gives manual training it is going to result in producing an improved body of

workmen. It seems so easy to deceive people this way, even intelligent people, because the average person not only lacks practical experience, but does not take the trouble to give the subject proper consideration.

To make myself clear, I shall give a little history of my connection with the first effort to establish a manual-training school in Chicago.

One Chicago Experiment.

About twenty years ago the Chicago Commercial Club got the idea that it wished to do something besides eat dinners and talk, and thought it would strike out on something in a practical line. So it had the subject of manual-training schools up at one of its dinners, at which Professor Woodward, of St. Louis — a great star, by the way — painted such a glowing word-picture of the importance of manual-training schools that the club was captured completely by him. As a result, a committee, of which I was a member, was chosen to go to St. Louis to visit the professor's school, and to determine whether we thought it would be advisable to establish such a school in Chicago.

On visiting the school, I was satisfied at once that it was nothing but a show institution, and not competent to promote mechanics, and I so told my fellow member of the committee. But he became most enthusiastic over the subject, and on our return made one of his brilliant speeches before the club. As he was one of those entirely impractical men, but possessed a lot of what is called "education and culture," he carried the club with him.

My opinions, expressed naturally in a simple, modest way, were without apparent effect.

Given a Fair Trial.

As a result, the club went into the manual-training school scheme, and I was put on the committee to look after the project. I gave it good, honest attention, and did a lot of work for a number of years to get the school started right.

I was determined to give the school a fair test; so from the first batch of boys that it graduated I took a boy — who was poor, and therefore the most promising — to see what I could do with him in the factory.

I placed him at work in different departments for different periods, in order that he might get what may be called an all-around mechanical education. I kept him in the shops for several years at an expense of about $2,000; but finally his head became so swelled that I could do nothing with him, and I had to let him go.

From the next batch of graduates I selected two, and told them to get overalls and overshirts and come to the shop on Monday morning, and I would see that they got started to work.

I was there according to appointment, but was told that the lads had been there, but had gone, and I never saw them again.

My impression is, that these boys did not like the looks of the shop — that it did not meet their expectations or accord with their tastes regarding work, so they cleared out.

Boys Spoiled, not Helped.

Now, this is exactly what I expected would be the case when I was looking over the St. Louis school. Instead of helping to make mechanics, it spoiled the boys for mechanical pursuits. Having found the Chi-

cago school also wanting, I immediately withdrew from any further interest in it. I considered it a great humbug, and the older I get the more am I convinced that my estimate was right, and that the humbug feature of such institutions has not grown less.

Education for Business.

My idea generally in connection with this subject is, that when we put boys through the common grammar schools, giving them manual training throughout the grades with their regular studies, we are giving them on the educational side what is absolutely required for ordinary pursuits of livelihood, and to make them good and useful citizens. I believe this is all the education that is required for ordinary business.

On the manual-training side in the grammar school, the boy may learn a great deal that will be exceedingly useful to him in his pursuit of a livelihood, whether he goes into a mechanical trade or not. He certainly should be well equipped to begin the practical pursuits of life. Manual training at this time of his life also tends to give him a liking and respect for mechanical pursuits.

Practically every one of the successful men of this country never had any more education than the grammar schools impart, and probably a great many of them did not get even half as much, with no manual training whatever. This makes it perfectly clear to me that a grammar-school education is all that is required for ordinary business pursuits. And a boy so equipped to-day, with such manual training as now is given in some of the grammar grades, is even better prepared for the battle of life than were the men who made this country what it is.

Weakening the Foundation.

I contend that when we go beyond this we begin to weaken or tear down the foundation we have been building in the common grammar school. When we offer education higher than this, we practically say to the boys: "If you will come to this higher school we will qualify you for something better than mechanical pursuits and the ordinary drudgery of life," and thus teach disrespect for the person who has had nothing but a grammar-school education. We lead the boy to believe that by going through the high school he will be able to make a living much easier and more pleasantly than if he quit at the grammar school.

The Trade School Unnecessary.

In a letter written to me, Mr. Andrew Carnegie says: "The apprentice system is a thing of the past; what do you propose as a substitute? The best one and the one better than the original is to give instructions to young men in technical schools."

I have fully dealt with Mr. Carnegie's proposed substitute, that the prime essentials in the making of good mechanics are not given in any technological course, but by long experience and close observation in the practical working of an up-to-date shop or factory.

Marked Industrial Changes.

It is true that the older method of making mechanics through iron-clad apprenticeship contracts practically has passed in this country.

Marked changes have occurred in the industrial field. Manufacturing has become highly systematized and specialized. Consequently the use and application of labor are very different from former times.

These changes present certain obstacles to the making of mechanics, but I do not consider them insurmountable; for they all may be overcome through systematic manual training in the grammar grades of the common schools.

Mr. Carnegie and other advocates of technical and industrial education claim that the technological course, the advanced manual training, and the trade school are to do this preliminary training, and that they will produce material for the shop as good as, if not better than, was produced under the old apprenticeship system.

No School Can Teach a Trade.

Here is where Mr. Carnegie and I part company. I maintain that no school can teach a trade; that even under present industrial conditions no school is needed for the teaching of trades — provided a reasonable amount of manual training is given throughout the grades of the grammar schools.

The one place to learn a trade is in the shops. The best trade school in the world would leave the boy with a great deal still to be mastered before he could be considered efficient. Then why ask him to waste his time in a trade school or technical course?

To apply my argument practically, I may mention conditions in the Crane Company shops to-day. We find that in our business we have no trouble in training boys to make mechanics. It should be said, however, that we have a slight advantage — but only a slight one — over what might be called shops that are specializing exclusively. We have boys who knock around for some time in the various departments, where they can not fail to get some knowledge of gen-

eral mechanics, and these boys we have no particular difficulty in training into good mechanics.

How We Train Apprentices.

We have skilled mechanics, and a supply of apprentices — for they are apprentices in every sense of the word — sufficient for all our needs.

These apprentices are trained in our tool and machine shops, where all the work is high-grade; consequently we are under as much disadvantage in regard to the class of work we are doing as any factory in the making of skilled workmen.

There is a feeling general among Americans that they do not like to be bound or placed under unusual restraint. This feeling we respect. Our apprentices are not held by formal contract, but by an unwritten contract which makes it clear to them that it is good policy on their part to be faithful and industrious, to be prompt and alert, to take advantage of all the opportunities we offer them for acquiring a trade and for promotion. The certainty of advancement if they deserve it is a stronger incentive to steadiness and efficiency than any formal contract could be. Every boy works on his merits, and is paid somewhat in proportion to the value of his services.

Boys Generally Stay.

These boys are free to go if they wish, but the fact is, that generally they stay and learn their trades, and remain thereafter in the employ of the company.

So, after all that has been said about the passing of the old apprentice system, we have no difficulty in making our mechanics. We experience no disadvantage in producing not only our skilled workmen, but

our own assistant foremen, foremen, superintendents, etc. Practically all of our responsible help has come up from the ranks; and in many cases has been developed from boys who got their trades with us.

And not only do we supply our own men in this way, but plenty of employers on the outside are seeking mechanics produced in our factories, and many who have learned their trades with us have gone out in this way and are occupying good positions to-day.

I am confident that many employers in mechanical lines would ten times rather have a Crane-trained man than the best man that ever came out of a trade school or technical college.

No Lack of Mechanics.

As we have accomplished all this without the aid even of such manual training in the grammar schools as I advocate, and as I firmly believe such manual training would supply all that may have been lost in substituting modern for old-time shop methods, I can not see any difficulty in the way of every manufacturer getting all the mechanical help he may need, without the aid of trade or technical schools, when manual training is made general in the grammar schools.

Even if it were true that it is difficult to get good men under present conditions, there would be no sense in going to technical-training schools for help, because that would be simply so much worse. This Mr. Carnegie would know if he knew anything about manufacturing, but as a matter of fact, he could not be expected to have any knowledge of this kind, because he knows nothing about manufacturing, and never did. I do not know of anything more absurd than for him to pose as an authority on matters of this kind.

Trade Schools Do More Harm Than Good.

I think the trade school will do more harm than good. It is not needed. It takes up the time of the boy that should be spent in the shops, and it costs him money instead of paying him something for his labor.

What I offer in place of the old apprentice system is something like we are doing in our own factories. Give the boys a good grammar-school education, and plenty of manual training in the grammar grades. Then let them get to work in the shops. Working at their trades, and using their spare time wisely, will give them all the practical and technical knowledge they require for any position and for the solving of any problem that the shop may have to offer.

CHAPTER X.

AGRICULTURAL SCHOOLING — DO ITS RESULTS JUSTIFY ITS EXPENSE?

There are in the United States to-day some seventy agricultural colleges and schools — with their regular, short and special courses — enjoying the benefits of the general government acts of 1862 and 1890.

They have an enrollment of more than 60,000 students. The value of the property of these institutions is nearly $86,000,000, of which enormous sum $50,500,000 represents material equipment. Their income from various sources is about $14,000,000.

They are supported through grants from the State, about fifty-five per cent; grants from the federal government, about fifteen per cent, and endowments, gifts, fees, etc., about thirty per cent.

Add to this the expense to the students and their loss of time, and it will be seen readily what an immense expense is connected with this branch of public education.

Reasonable to Ask Proof.

In view of this great expense, it is neither unreasonable nor unfair to require of these institutions clear proof that they are of benefit to the public, at least commensurate with their cost.

You can not expect the public to take this for granted. There is so much being written and said about the utility and great importance of these institu-

tions that naturally it has occurred to me that they may be overestimated and the public deceived. Among the boastful claims made for them I cite the remark of the Hon. James Bryce, before a graduating class of the Agricultural College of Wisconsin, that " here in Wisconsin, you have, by the judicious application of science to agriculture, practically doubled the output of your soil." This may be taken as an example. Almost as striking claims have been made by the colleges themselves.

To a person who has worked on a farm, and had a long and extended observation of farming activities, such statements seem most absurd.

Allowance for Exaggeration.

I make due allowances for the enthusiasm of a public speaker, and even for the exaggerations of some educators; and I will not ask our agricultural educational agencies to show one hundred per cent of benefit to the farming community, or even fifty per cent.

In fact, our farming industry is so immense and important that I should consider the cost of our agricultural education justified if the colleges could show a gain of even ten per cent to the country and agriculture through their efforts.

And in going into this inquiry I challenge the colleges and schools to show even this.

As to the claim that has been made that a full course, consisting of four years in high school and four years in an agricultural college, is a good investment for the farmer, I do not hesitate to declare it utterly absurd and not meriting consideration.

In a general way these colleges and schools give instruction for the benefit of the farmer in agriculture and mechanic arts, (1) direct to students in full, short, and special courses, (2) through bulletins mailed free to farmers, and (3) by lectures delivered at Farmers' Institutes. They also claim "to prepare teachers, investigators, and men who have the ability to extend the fields of agricultural knowledge."

They have run wild on education, and have gone into a great variety of higher education having no connection whatsoever with agriculture.

Greatest of Our Industries.

It is generally recognized that farming is the most important of our industries, and that the farmers are among the most substantial of our citizens.

Therefore, anything that gives reasonable promise of helping the farmer, of bettering agriculture, readily meets with the support of public approval and the public purse.

And it is consistent with this support, and the great public expense, that we should hold the agricultural colleges and schools as stewards of the public and demand of them an account of their stewardship.

Certainly, the people who put their hands into their pockets and support these institutions have a right to this accounting. The whole community is taxed to support them, but there is no reason why it should do so if it derives no benefit from them.

I shall give the results of my investigations, based chiefly upon responses to letters of inquiry that I have sent out to practical farmers, students, graduates and heads of representative agricultural institutions.

It should be noted that in this investigation I am treating the agricultural colleges and the experimental stations as one.

Why Has the Crop Yield Fallen?

I might have dismissed this whole subject of the utility of our agricultural colleges, simply by referring to the statistics on farming, which show that the yield per acre of farm crops, in all the middle section of the country, has fallen largely since the agricultural colleges were started, instead of having increased one hundred per cent, as Mr. Bryce said was the case for Wisconsin, on the authority of the agricultural college men.

I also might dismiss this whole subject simply by saying that every feature of the farming industry was thoroughly understood and exhaustively treated in books long before agricultural colleges were started, and that nothing of importance has been discovered or added to this knowledge since.

Realizing, however, the strong hold these agricultural colleges seem to have on the public, it is necessary to go into this matter at length, to show up, as fully as may be, the false and misleading claims made by these institutions, and to give the results of my investigation.

In beginning the investigation, I took what seemed to be the natural and most direct way; I went straight to headquarters, in an endeavor to get from the college heads some information as to what agricultural colleges are accomplishing in this line, for they certainly ought to be in a position to furnish this.

College Men Questioned.

Following is a set of questions I sent to heads of Agricultural College, Michigan, and the agricultural colleges of the Universities of Illinois and Wisconsin:

1. In what respect do you find the good farmers deficient in operating their farms?

2. Have you ever issued any general instructions to farmers, directing them how to run their farms to the best advantage? If so, what are they?

3. Have you ever taken one or more good farms and operated them for the purpose of demonstrating what they were capable of producing under what might be termed scientific and intelligent farming? If so, state results obtained, number of farms, names of owners, and where located.

5. (a) Do not such gatherings as State and county fairs, and the various periodicals and other literature published for the farmer, supply him with all the information necessary to enable him to obtain the best results from his farm?

(b) If not, can not persons situated as you are, furnish him with the information he lacks without it being necessary for him to spend his time and money attending an agricultural college? If you believe this to be impracticable, please state your reasons.

6. Have you ever received applications from practical farmers for young men from your school to work on their farms? If so, please give the names and addresses of these farmers.

[As question 4 relates to another branch of the inquiry, it is omitted here.]

Answers to this inquiry were received from one of the faculty of the Wisconsin college (who was careful to say that he expressed merely his personal opinion), and from the dean and director of the College of Agriculture at the University of Illinois.

To print their letters in full would occupy too much space and I therefore give a synopsis of them as follows, showing from their testimony how completely they fail in doing any good to the farmer.

Wisconsin University.— While my correspondent claims, in answering the first question, that good farmers are deficient in many respects, he answers practically "No" to the second question, except such instruction as is "contained in the bulletins and reports published by experiment stations." The third question is also answered in the negative. To question 5 he answers, "Yes, if he has the power to absorb and digest and the will-power to execute," and admits that there is nothing so effective as the example of what others are doing. At the same time he claims the farmer requires the inspiration that comes from college associations, the inference being that this is the only thing the farmer needs to go to college for, as he gets everything else by observation and experience.

The Voice of Other Colleges.

Illinois University.— After claiming in his answer to the first question that the principal deficiency in good farmers is "along economic lines," the correspondent answers "No" to questions 2 and 3 and adds that "the best demonstrations of good farming are those that are being made upon thousands of successful farms throughout the State, and there are about as many models of them as there are individual farmers," which gives the inference that his school is entitled to credit for these successful farmers.

This, of course, is absolutely false. If it proves anything it proves that the farmers obtained success without the colleges and therefore do not need them.

He answers "No" to question 5, adding that the farmer "needs a vast store of that which is got on his own ground by his own information and experience." He can not get it all from examples.

In answering question 6, both Wisconsin and Illinois claim they are receiving many applications for their graduates from the farmers; but this statement does not agree with the facts thus far brought out in my investigation, which show that there is but little demand among the first-class farmers for this class of help.

Where the Colleges are Lacking.

Fearing that the replies from the colleges, and my comments as given above, may be too complicated for my readers to digest them, I will give the substance of them briefly:

While they claim that the farmers are deficient in the running of their farms, they admit that they are doing nothing in the way of issuing general instructions directing the farmers how to operate their farms to the best advantage, and that they have never taken a farm and operated it for the purpose of demonstrating what it is capable of producing under what might be termed scientific or intelligent farming, which would be the natural and businesslike method if the colleges possessed any information of value to the farmers.

The statement already quoted from the letter received from the Illinois college, that "the best demonstrations of good farming are those that are being made upon thousands of successful farms throughout the State" (which applies equally well to every farming State in this country), goes right to the bottom of this whole question.

Plenty of Successful Farms.

The country is full of these successful farms, and farmers everywhere have an opportunity to observe them and in this way become acquainted with the best farming practice.

As an illustration of the lack of substantial information on this subject, I refer to a conversation that I recently had with a prominent Illinois farmer. He stated that, upon applying to one of the leading professors of the Illinois college for information as to what to do in order to get the best results from a certain piece of land, he was advised to put it into clover and then go through the regular process of plowing this in, which, of course, would necessitate the loss of a crop that year.

Instead of doing this, the farmer bought fertilizer, which resulted in a large crop that season, and thus he was a long way ahead on the venture. Still, this farmer says that fertilizers are expensive and that good judgment must be exercised in applying them.

It will sometimes be noticed that one farmer will obtain say 80 bushels of corn per acre, while the farmer on the adjoining piece of land will have, perhaps, only 40 bushels, and the question naturally arises, why does not the latter consider it to his advantage to get as much out of his land as his neighbor?

More Light Needed.

The one obtaining the 80 bushels must do this either by the use of fertilizers or by allowing his land to be pastured for a year and in that way become enriched; and, as it is difficult to imagine that the man who gets only half this quantity is entirely ignorant, I

think it may be concluded he feels he is just as well off with a crop of 40 bushels as he would be if he went to the expense of fertilizers, or allowed his land to go into pasture for a time, in order to secure double that quantity.

From the foregoing it is evident that this subject is far from being solved and that there is a chance for much light to be thrown on it.

The only thing the colleges have undertaken in the branch of farming covered by this investigation, has been the teaching of it and the conducting of experiments on a small scale, which, in my opinion, can be of but little value, as it is mainly theoretical, the teachers being simply theorists.

Value of Agricultural College Work Not Conclusive.

The great problem to-day for the farmer, and, indeed for everyone who is interested in the question, is how to get the most out of the soil and maintain its maximum fertility. Any person who is able to throw light on this subject is entitled to the greatest consideration.

It will be seen by reference to the note to questions 1 and 2 [in the subjoined list of questions] that I wished to except from this part of the inquiry such special features as butter and cheese making, stock breeding, special fertilizers, and the study of seeds. For the present, therefore, I shall consider only the three classifications — rotation of crops, cultivation, and the care and feeding of stock.

These three features cover about ninety per cent of all that concerns the ordinary farmer. The other

subjects will be considered later on in this investigation.

I have mentioned two reasons why I might dismiss, without further inquiry, the whole question of the agricultural college helping the farmer. I may now name still another reason.

Among the questions I asked the colleges as to where they found the farmer deficient, they enumerated certain things.

I also asked them whether they ever had issued any general instructions to assist the farmer in running his farm, and they said they had not.

Now, it is inconceivable how any institution can help a person without giving him definite and clear instructions as to how to do his work; particularly where it seems to be apparent that the person is doing his work wrong.

Questions Asked of Farmers.

As the colleges admittedly fail here, I shall present the testimony of farmers themselves as to the practical value of agricultural education.

From the county clerks of twenty-eight counties in the States of Illinois, Michigan and Wisconsin (and in sections immediately surrounding the respective agricultural colleges, because there, if anywhere, the benefits of the colleges should be known) the names of 464 representative farmers were received; and to these the following questions were sent:

1. Have agricultural colleges been of any assistance to you in operating your farm, either through literature that they have published, or by lectures?

2. If so, please state specifically how they have helped you.

(NOTE.— This investigation has reference only to matters pertaining to the running of an ordinary farm and does not include special features, such as butter and cheese making, stock breeding, special fertilizers, the study of seeds, or the other matters that belong to the experimental station.)

3. Have you ever employed on your farm any person who had attended an agricultural college?

4. If so, what has been your experience with such help — that is, have you found their services more satisfactory than the services of ordinary farm hands who never attended college?

5. If you consider the former class of help more satisfactory, please state in what respect you have found them so.

6. Would you be willing to pay such help higher wages than the ordinary farm hand, and if so, how much higher?

7. What is the general impression in your neighborhood regarding the merits of agricultural colleges?

8. Have you sent any of your children to an agricultural college?

9. If so, do you feel that they have been benefited by such experience?

10. If they were benefited, please give some details regarding the benefits derived; also state whether you consider that these benefits are worth what it costs to take a course in one of these schools, estimating this to be about $3,000.

This set of questions was answered more or less fully by 163 persons.

CLASSIFYING THE ANSWERS.

The answers first were divided into two classifications — those favoring the general proposition that

agricultural colleges are beneficial; and those who do not consider them of assistance.

In the first classification forty-one were favorable without stating why, and fifty-four were favorable, stating reasons for their position — a total of ninety-five.

In the second classification sixty-eight answered "No" to the first question.

From this classification it will be seen that a majority of the farmers responding are disposed to say a good word for the agricultural colleges; but a close analysis shows that, with a few exceptions, they fail to be convincingly specific in answering the first and second of my questions.

But, granting that every one answering "Yes" to these questions had specifically shown practical benefit through the activities of these colleges, the question still would remain: Would this benefit justify the existence of the agricultural colleges at public expense?

I maintain that educational enterprises should be carried on at public expense only where they meet with practically unanimous public approval.

It is difficult to conceive how anything that is looked upon with disfavor by so large a minority as is shown in the answers received from my inquiries, can be of material advantage or can be considered fairly as a justifiable public charge.

The farmers who in their answers speak favorably of the colleges seem to take three general views:

First: They think the experimental work of the colleges will help them.

Second: They receive information of benefit to them in their farming from the general Government through these State institutions.

Third: The State institution is doing special work in the direction of eradicating tuberculosis and other diseases of farm animals, and also in suppressing various kinds of insect and vegetable pests.

As Sources of Information.

As I hold it unreasonable to imagine or to claim that the colleges can teach in the classroom anything that is of practical use to the farmer, I believe I am justified in the opinion that the farmers who speak well of these colleges do so because they consider them disseminators of helpful information. They, like myself, place little or no value on the agricultural college as a place where boys may be taught practical farming.

Coming back to the farmers' letters, I find that the benefits said to have been derived from the colleges fall almost wholly into the following five classifications: Rotation of crops, fertilizing, cultivation, study and selection of seeds, and care and feeding of stock.

As the assertion is made in nearly all of the favorable responses that the benefits were received through bulletins and lectures, I naturally tried to discover the character of these sources of information and help.

As I could not secure the lectures I was obliged to confine my search to the bulletins; but I assume that the lectures cover nothing that has not been published in the bulletins.

For the purpose of ascertaining what information the bulletins give on these special subjects, I have gone carefully over the bulletins issued by the Michigan station for 1905 and 1907; by the Wisconsin station for 1905 and 1906; eleven unbound bulletins issued by Wisconsin at various dates; and twenty-five bulletins

and circulars sent out by the agricultural college of the University of Illinois — comprising in all some 3,200 pages of printed matter.

I have not found in the Michigan and Wisconsin reports a single bulletin that gives fully important information regarding the rotation of crops, cultivation, or fertilizers. There is incidental mention of these subjects scattered through the various bulletins and in accounts of experiments statements are made as to fertilizers used, but nowhere is the information given concisely and by itself.

Something about Fertilizing.

The Illinois reports show that the problem of permanently maintaining the fertility of the soil is being studied and that in their experiments they have found that by employing certain systems of farming and using phosphorus as a fertilizer (they recommend rock phosphorus) yields can be profitably increased and soil fertility maintained.

These results, however, must be looked upon as experimental until it can be shown that the ordinary farmer by utilizing the information given in the bulletins has been enabled to make his farm more profitable. Results obtained in actual practice would be much more convincing than those obtained in experiments.

As to the care and feeding of stock, some of the bulletins have gone quite elaborately into this, and figures are given to show how much better results have been obtained from certain methods of feeding and from certain feeds; but nowhere in the 350 odd pages I have read do we find reduced to a few simple rules, that could be understood and followed by the ordinary farmer, information that would enable him without

expensive experiments on his part to raise and fatten stock for the lowest possible price per hundred pounds.

As different feeds are used in States producing the same crops, it is apparent that feeding is largely a matter of individual judgment and local conditions as to relative price of foods, etc.

There is a needless amount of detail and over-refinement in the published reports of the experiments that can be of no practical value and which serve only to confuse.

Feeding Stock Special Business.

In any event, the feeding of cattle has come to be largely a special business; that is, men now make a business of buying cattle and fattening them for the market, and I doubt whether any information can be supplied that would be of any special assistance to them in this matter. Their interest in this matter is so great that they naturally would get the best results, so that there could be nothing about which the colleges would be able to give them information.

As convincing proof that the farmers who answer "Yes" to my first question estimate the agricultural colleges almost solely as distributors of information, and not as makers of practical farmers, I refer to their answers touching the employment of college-trained men on their farms and to the sending of their children to these colleges to be trained as farmers.

Of the sixty-eight who said they had not been benefited by the colleges, nine say they have employed college graduates on their farms and that they all had proved to be unsatisfactory.

Of the ninety-five who are favorable to agricultural

colleges, eleven have employed such help, and three of these say that this help has not been satisfactory.

With reference to the question of sending their children to the agricultural colleges, only five out of the ninety-five who are in favor of the colleges have done this.

Among those unfavorable to the colleges, three sent their children to an agricultural college, and in two of these cases they report that the result was not satisfactory.

Is it not strikingly inconsistent that so few of those who favor the colleges either have employed college graduates or have sent their children to college?

Among the farmers favoring agricultural colleges a number went out of their way to say a good word for these institutions as being dispensers of higher ideas, etc., but none of these claims has any particular bearing on the subject of my investigation.

What the "No's" Have to Say.

It is evident from the letters received that the farmers answering "No" to the general proposition — 68 out of 163 — are just as positive that their position on this question is right as are those who have answered "Yes."

In fact, among the negative responses are some who go so far as to say that these colleges actually do harm; that young men turned out by them are not as good farmers as the young men who get all their training on the farm. Here are a few of these opinions:

One writer says he sent one of his sons to Agricultural College, Michigan, and in answer to my question, "Do you feel that he has been benefited by such experience?" answers: "Yes. It could hardly be

otherwise; but equal benefits could have been derived at our home town at less cost. The agriculture taught at the college is not and never can be the husbandry of the farm."

Another writes: "We thought of sending a boy, but before we got ready a neighbor sent a boy, and he has come home. You should see his farming! It surely did not do him any good. Another neighbor's boy went. He has come home a first-class farmer; but he was good when he went away, and so was his father."

Another suggests: "I should say a boy had better go to some good school and graduate; then go to the best farmer he can find and tell him he wants to learn to farm, and ask for a job. Try him six months, and if he does not think his employer is up to date and he could get more from another, hire to him. I should say that a three-years' course like this, working on an average one year for each farmer, should round a young man up in pretty good shape to begin for himself."

Still another says: "The dean of the Wisconsin Agricultural College advised my neighbor not to take a course there unless he wished to become a teacher. This does not refer to the experimental station."

The Fundamental Things.

In order to avoid confusion I would remind my readers that I started out in this investigation to discover what the agricultural colleges were doing along the important lines of rotation of crops, fertilizing, and cultivation, as I regard these as being the fundamental features of practical general farming.

It will be seen from what I have said here that there is nothing in the college bulletins on these topics (which cover ninety per cent of all) that is of any importance to the farmer, notwithstanding the enormous amount of writing and printing the colleges have done on these subjects.

The Short Agricultural Course Fails to Justify Its Claims.

In introducing this topic I dismissed the full or regular course of the agricultural college as being so completely ridiculous and impractical that I would not discuss it. The short or special courses of these colleges, however, appear to appeal to many as having some value, and for this reason I shall consider them.

In the short and special courses the colleges say in effect to the farmer: "Here is an assortment of practical things. Among them you'll find something you need. Take your choice."

This sounds very fascinating. But if the colleges have these things to offer, they also should have the intelligence to know whether or not the farmer really needs all or any of them to make him practical and successful.

They also should know whether the farmer is correct in fancying that he does need something from the college, and whether he can get anything of practical advantage from the college, should he take one or more of the short or special courses.

For example: I have seen a picture of an audience of 2,000 farmers listening to a lecture on tuberculosis. The professors are in the act of dissecting the animal to show the disease. Can anyone imagine a more stupid piece of business than for the professors to

invite the farmers to leave their work to come and look at this operation? What do you suppose the farmer would know about this after the lecture? Is he to cut up his animals? He wants to know how to judge them without doing this. Such lectures and demonstrations are purely matters for veterinary students.

Some of these short courses consist of teaching boys how to select corn for seed; others teach them how to lay tile for drains; others how to judge stock. All of this is perfectly stupid, and it is an outrage to call farm lads from their work to teach them things that they know as much about as the colleges. This is a fair specimen of the way the farmers are deceived and humbugged by the colleges.

What Does the Farmer Need?

The important point just here is: What or who is going to settle correctly whether the farmer actually does need the aid of the colleges? The mere fact that here and there a farmer imagines he does need this help, or is persuaded that he does through the attractive arguments of the colleges, is no evidence that he actually does need college assistance.

The fact that any feature of education is in demand is no evidence that it has merit. The mere fact that many people go to the higher schools is no evidence whatever that they are benefited by these schools, because they have no means of judging whether what they learn in the schools is going to be beneficial to them. In their inexperience they go to the schools on account of the general public clamor, and because of the men who are at the head of these insti-

tutions. They have no knowledge whatever that they are benefited by the schools.

The Point for Comparison.

What I have already said along this line in Part One regarding "higher education" generally applies equally to agricultural schools.

The point as to whether the farmer actually needs the help of these short and special courses can be determined best by looking over what the colleges offer in this line, and comparing what these courses offer to teach with the practical working of the farm.

In looking over Bulletin No. 140, General Series No. 79, issued by the University of Wisconsin, being, "a circular of information relating to the short course in agriculture," I find this course covers the following lines of instruction:

Breeds of Live Stock: Breeding, Judging, Care and Management.

This appears to be a two years' course. As I understand it, the breeding of any animal to a large extent is systematic and skilled work, and to get results something beyond the ordinary in this direction, the work must be conducted by a person who has extraordinary judgment, a great deal of experience, and who has made a thorough study of what has become a special business.

Of course, every farmer knows enough to select his best stock for breeding purposes and to keep the best stock in his herds. I maintain, therefore, that this course offers nothing practical to the ordinary farmer.

Feeds and Feeding.

This also is a two years' course. In it the college seems to have gone into the greatest refinement, taking in such matters as digestion, etc.

I have looked over a book of six hundred pages (one of a dozen or more text-books used by the college in the short courses) entitled, "Feeds and Feeding," by Prof. W. A. Henry, of the University of Wisconsin. The author has gone into the subject with such complication and refinement that I question if one farmer in a thousand would be able to get any practical information out of it.

This book is a good deal in the nature of what comes from this class of writers. They go so far in their explanation of the various phases of the subject and one has to wade through such an immense amount of immaterial matter that it is difficult to find out the points they are trying to make.

One Useless Book.

Common sense warrants the conclusion that this book is a pronounced failure, so far as conveying any information of value to the farmer is concerned. In fact, the ordinary farmer would get as much out of it if it were written in Latin.

The book gives the results of certain combinations of feed, which may have some value to the farmer after he has figured out and determined by actual experiment which feeds he can use to the best advantage.

The book shows that in some parts of the country one feed combination is used to advantage, while in other parts of the country, raising similar feed crops, a different combination is used.

It seems strange that some one has not determined which combination will produce the best results. It stands to reason that something could be done toward making this clear and getting some practical results from it; but we don't need a book of any six hundred pages, either to show us how or to tell us when it is discovered.

Veterinary Science.

I shall pass this with the simple observation that no ordinary farmer expects to be a veterinarian. Naturally there are many small matters in reference to taking care of animals when they are sick, for which a brief bulletin might be of value to the farmer; but this is as far as the ordinary farmer can be expected to go in veterinary science.

Soils.

This also is a two years' course, and it is treated exhaustively. In my judgment, this is a matter from which the experimental stations might get good results, but that it is not a matter for the farmer to go into at all.

Plant Life and Horticulture.

This requires a two years' course. The text-books are rather exhaustive treatises on a great variety of subjects connected with plants. The course might be interesting to a gardener, but it is nothing for the farmer.

Farm Dairying.

Butter and cheese making have become very largely specialized businesses, and no doubt they have received the skill and study that every large business receives.

It is highly improbable that schools could give those engaged in these lines any information; and it is reasonable to assume that a person wishing to learn butter and cheese making would go to one of the factories, where he not only could learn the business from trained men, but at the same time would be earning wages. The rest of this course is covered in my comments on "Feeds and Feeding."

As to the general care of stock, cleanliness, etc., all of which affect the quality and purity of milk, the farmer needs nothing more than the requirements of the contracts he signs with the management of the creameries to which he sells milk.

Agricultural Chemistry.

The colleges have gone into this subject systematically, and, while it may have some advantages for those making an exhaustive study of agriculture, it is positively of no use to the farmer.

Bacteriology.

This is about as valuable as chemistry to the ordinary farmer.

Farm Bookkeeping and Business Accounts.

It is probably a good thing for the farmer to have some system of keeping accounts, so that he may know what each field produces and also what each crop costs, taking into consideration interest, taxes, cost of fencing, etc., and also the cost of maintaining the fertility of the soil.

To determine this latter matter with accuracy, the farmer must not rob the soil of its fertility for the benefit of one crop at the loss of a succeeding crop.

Doubtless, this is a pretty nice question for the ordinary farmer to settle, and it would be interesting if it could be made clear to him just how to do it.

Agricultural Economics.

In this subject refinement of treatment is carried to great length. Yet it is much in line with what I have said on bookkeeping — that is, it aims to teach the farmer how to find out what crops pay him best. But the difficulty must be apparent of any one being able to convey clear-cut information on this subject that would be practically valuable to the farmer.

Farm products vary considerably at different times. One year may bring a big crop at a low price; but this is no reason why the farmer should not raise any of this crop the next year. To go into this matter as the college proposes in its bulletin would lead to an enormous amount of complication, and I am convinced that nothing practical could come of it.

If a soil becomes exhausted from producing a particular crop, but is good for some other crop, every farmer knows enough to make the change without being told. If a pest destroys a certain crop, it would be folly for the farmer to fight the pest; he should produce a crop that would not be attacked by that particular pest. These are features of agricultural economics in which the farmer needs no college instruction.

Farm Crops.

On this topic the circular says the object of the course is "to fit students to judge samples of grains in a systematic manner. Best methods of testing the seed, planting, cultivating and curing crops are discussed."

I maintain the farmer is able to see without going to college whether a potato is big and clean, the size of an ear of corn, and of the kernels on the ear. The farmer always has selected the best of his crops for seed. He doesn't need to be told to do this or how to do it. These are perfectly obvious things, and so this course seems to me to be unnecessary.

Agricultural Engineering, Practical Mechanics.

Agricultural engineering embraces architecture. I do not think there is anything to be gained by teaching farmers architecture. This is a matter for the architect or builder, and all farming communities probably are well supplied with such talent.

When it comes to machinery, the college is really getting down to something in which it might do some good. This is something that meets with my hearty approval, and there is no doubt it would pay the farm boy to take a year's course in practical mechanics. I hold, however, that training in such lines — manual, etc., — should be given in every district school, and that if this were done properly, there would be no occasion to send a boy to college for simple mechanical instruction.

Doubtless, though, it would be a good and useful thing, if these colleges, in their mechanical courses, would devote themselves to the making of teachers who would be fully competent to go into the district schools of the country and instruct farmers' boys in manual training and elementary mechanics.

Nothing Practical Offered.

Thus I have passed briefly through the short and special courses. Looking at the whole subject from

the common-sense, practical point of view, I insist that there is nothing offered in any one or all of these courses of any real practical value to the farmer.

Everything that the colleges issue is altogether too voluminous, too technical, and goes too much into largely inconsequential matter, such as the details of unfinished experiments and the complete report of experiments with no results.

It is encouraging to note that after the University of Wisconsin has issued tons of this valueless printed matter and taken up the time of thousands of farmers to read these pamphlets with no results, it now sees and acknowledges the stupidity of its former practice, announcing that hereafter "more emphasis will be given to the presentation of the practical results obtained from the experimental work."

An Oversupply of Literature.

But why have colleges to do even this publishing? This country is enormously supplied with agricultural literature. In fact, I consider this matter is vastly overdone already. The farmer is overburdened with standard and modern agricultural books, college and experimental station bulletins, magazines, farm papers, and weekly newspapers. Consequently there is no reason why the colleges should add to the volume of printed matter — admitting, for the sake of argument, they have anything worth adding.

The great trouble with writers on educational topics is that they do not seem to have any idea of economizing in words or time. To my mind, there is nothing so clearly shows the stupidity of most writers on economic subjects as the lack of economy they show by using too many words. They seem to have

nothing of importance to say, and to hide their ignorance they smother it with words.

The Training of Teachers.

The colleges may claim that though certain things they teach may be of no direct practical use to the ordinary farmer, yet they are needed in the training of teachers. But why instruct teachers of agriculture how to impart information that the farmer neither wants nor needs?

The colleges can find out readily from their graduates what benefits they have derived from a college education, and certainly these colleges are not warranted in continuing their work unless they have clear and positive evidence that the results are beneficial.

I maintain that it is distinctly wrong for any educational institution to take a man's time and money in teaching him a lot of things that are of no practical value to him.

Educators should be absolutely sure on such points before encouraging young men to take a course in college, whether that course be long or short, thick or thin.

Experimental Stations.

Before summing up this feature of agricultural education, I wish to refer briefly to the experimental stations that are conducted generally in connection with the State agricultural colleges.

Much of the matter that I have been commenting on comes from the experimental station, and consequently the experimental station fails to be of real practical service in about the same measure as the college does.

Analysis of Bulletins.

I shall make brief reference to a few of the bulletins on experimental work that I have not mentioned previously:

On Milk. There is a large number of bulletins on milk. One deals with "The Associative Action of Bacteria in the Souring of Milk" — eighteen pages telling scientifically how milk sours, but not one word telling practically how to keep milk from souring. Summed up, these bulletins say to the farmer: Keep the cows free from tuberculosis; be clean. This whole talk on milk is simply a jumble of scientific terms and hair-splitting theories.

In short, from the amount of stuff the experimental stations have published on milk, we would suppose it was an entirely new product. Yet I can remember that when I was a boy, the farmers' wives had good milk. They knew how to keep the pans sweet and clean, how to gather the cream, how to keep the milk cool and sweet in the cellar, how to make the best of butter. How in the world could they have done these simple things without the aid of experimental stations, agricultural colleges and bulletins?

Drainage. This bulletin doubtless contains information of some value, but the subject is well understood among farmers. The experimental station appears simply to have handed down old information that was fully published in books many years ago. As nothing new is said, there was no need for this printing.

Pests. A great deal is said about pests, both those that attack farm animals and those that destroy grain and fruit crops. Some of these are proper studies for

experimental farms or for the State, particularly the pests affecting animals. As for the pests attacking crops, the bulletins I have read deal chiefly with proposed weapons for combating the insects and fungi that attack the apple-tree. They deal with a great variety of pests, and tell how to detect them at different stages. The language may be considered highly technical, and, perhaps, scientific, and I consider it most absurd to send out such literature to the ordinary farmer. Nothing practical can come from it. It would be far better to advise the farmer that if pests attack his apple crop, to let the apple business alone and devote his energies to some more profitable crop.

An Unnecessary Expense.

Alfalfa in Michigan. This bulletin takes ten pages to tell of experiments in growing alfalfa in Michigan, in which the experimental station coöperated with some eighty farmers in various parts of the State. The outcome was the conclusion that alfalfa was a failure in that State. Why didn't the experimental station find this out itself, and not put the farmers to trouble, expense and loss?

Substation of Upper Michigan. This appears to have been established to show that hundreds of experiments in farming the cleared northern timber lands produced practically the same results. The station might have shown whether there was profit in such farming, and thus have given us something new; but it didn't do anything of the kind.

Roadmaking. A bulletin of forty-eight pages on this subject comes from Wisconsin. To follow out its instructions fully would require a machine equipment that no ordinary farming section could afford.

The bulletin goes into all phases of this subject, from corduroy roads to macadam and park boulevards. It shoots entirely over the head of the average farmer. No information is given that can be of any practical use to him.

On Swine. Twenty-two pages on pigs and piggeries make this part of farming seem such a fine art that one wonders how the farmers ever managed to raise hogs before.

Prominence of the Impracticable.

There are a great many other bulletins on various subjects, but none of them contains any practical information of value to the farmer. I think I have now given enough to this subject to convince my readers of the impracticability of everything coming from these experimental stations.

I do not wholly condemn experimental stations, but I can see nothing coming from them to warrant their existence as they are managed now. It appears to me reasonable that each State government (especially in the Western country) should have an experimental farm in charge of a practical farmer of sound judgment and wide experience, to be on the lookout for new lines of agricultural products and to test them with a view to determining their value to that particular part of the country.

But one good man for each State could do all that is necessary in this direction — and he would not need to be a college man either.

Whatever of practical value to the farming community the experimental stations may have given, it seems absurd to me that the agricultural colleges should claim any credit for it. From the first this has

been Government work, and doubtless the great bulk of any results thus far attained should be credited to the agricultural department of the general Government.

Some Extravagant Claims.

We are continually seeing extravagant assertions in the papers as to the great things the agricultural colleges and their students are doing by way of improving the condition of farms and farm products; but after the closest observation and care in reading hundreds of the college bulletins, I do not find a single clear-cut case where they have made an important discovery or an improvement in anything.

I believe now I have covered all the points necessary to strike a fair estimate of the value of agricultural education to the farmer and to the State.

I have shown what these institutions have cost to establish and what it costs to maintain them. I have given a statement from a college professor setting forth what the colleges aim to do. I have given the results of an inquiry as to what the farmers think of these colleges. I have pointed out the utter absurdity of the college claim that the long course — meaning, practically, four years in high school and four years in college — is needed to make good ordinary farmers. I have shown that the ordinary farmer has no need for any one or all of the so-called short or special courses. I have analyzed enough of the agricultural bulletins to strike a reasonable average. And I have expressed my doubts as to the real utility even of the experimental station.

All in the way of education that it is necessary for a farm lad to have to make him a successful, up-to-date farmer could be given in the schools of the country

districts at but a trifling additional increase of the present common-school tax. Let every district school have a good teacher of manual training and elementary mechanics for the boys and a good teacher of the domestic arts — cooking, sewing, etc., for the girls — and the taxpayer would be getting something worth while for the small added tax. Let this be done well first. Make the foundation sound and broad.

Something to Be Taught.

Surely it is vastly more important to teach farmers how to take care of themselves than to teach them how to fatten cattle, feed horses and raise hogs. Teach the farm boys and girls in the common schools how to make better and more comfortable homes, how to do better cooking, how to use their heads and hands to much more general advantage. Teach them more of these simple, practical, needful things, and no one need worry about their learning all the practical agriculture they require right on the farm.

I wish here to repeat that I am not opposed to education, but only to its useless and extravagant frills and fads. I am most decidedly a champion of that education which, first, aids a man in earning a livelihood, and so contributes to his own happiness; and second, makes of him a good citizen, and thus contributes to the happiness of others.

Education the Farmer Needs.

The education the farmer needs to meet both of these essentials he should get in the country common schools. His practical education he may get best — in fact, only — on the farm. If he feels that he wants

more than this he should not expect the public to pay for it.

The agricultural college, thus far at least, has been the fifth wheel to the farmer's wagon, and it has cost him a pretty penny to keep it going. Until the farmer or the agricultural college can show definite and really valuable results coming from the agricultural education of to-day, common sense and sound business judgment must place it among the fallacies of our complicated "higher" educational machinery.

CHAPTER XI.

HOW THE UNIVERSITY OF WISCONSIN DEFRAUDS THE STATE.

The substance of what I have said thus far on agricultural colleges was published about a year ago, and I was under the impression that after such publicity these institutions would be a trifle more modest in their claims. This, however, does not seem to have been the case, if one may judge from several articles printed recently in newspapers and magazines.

I think that in the foregoing pages on this subject I have made it clear that the University of Wisconsin — like practically all of the higher educational institutions — is a great fraud and an imposition on the public. All these institutions resort to an immense amount of deception, but none of them, so far as I know, can be compared with the university at Madison in its barefaced misrepresentation of facts.

While I realize that this is pretty strong language, let us see how the facts bear me out.

Some Reckless Statements.

I quote from two full-page articles in the Chicago *Record-Herald,* of July 11 and 18, 1909, by Mr. Charles H. Leichliter, as follows:

> Wisconsin is in all probability the one State in the Union whose entire population "goes to college." That the University of Wisconsin literally is teaching the

entire 2,500,000 population of the State is explained by the fact that it has an exceptionally well-developed extension course.

And again:

In 1906 20,000,000 more bushels of corn were produced by the State than in 1901, on the same area of ground. That meant easily ten millions of dollars more in the pockets of the farmers. . . .

Through its college of agriculture Wisconsin has so educated the farmers of the State that the yield of barley has been multiplied in the past five or six years many fold, and barley development of the State, which consumes so much of that grain, is only beginning. Professor Ransom A. Moore, of the university, estimates that by the year 1912 approximately 50,000,000 bushels will be grown in the State, and that in the crops for the following year, if the experiments now being carried on develop, as the light of past experience indicates they will, Wisconsin will be able to produce enough barley of the finest variety to plant the barley acreage of the world.

The ground is taken that this university is entitled to the credit for this increase in yield.

In going into the subject of corn, I am fortunate in being able to prove that this university is misleading, by its own records, as shown in its reports; so that the public can not accuse me of being prejudiced or unfair in the discussion of this matter.

We will now see what this experimental station has to say on this subject in its annual reports of 1904 to 1908, inclusive.

In the report for the year ending June 30, 1904, the experimenters give an account of their work with Silver King corn on eighteen and one-half acres of ground.

I have no reports previous to this year, but this appears to have been the first experiment with this corn,

as this report makes no mention of any previous experiment.

The report states that the yield obtained was 72½ bushels per acre, and the yield of seed corn was 12 bushels. It has no remarks to make of any importance, however, regarding this corn. All it has to say is that certain methods of planting were followed and attention was given to the question of suckers, smut, etc.

As to Yield of Corn.

Nothing is said as to whether the yield was satisfactory, or whether it was better than the yield of any other corn.

The 1905 report shows that there was a wide variation in the yield, one row giving a yield of 296 pounds, while another gave only 29¾ pounds. There was also a wide difference in the yield of select seed corn, one row giving 56 pounds, while another gave only 1½ pounds.

The total yield showed a variation of from 14 to 97 bushels per acre of shelled corn, the average yield being 58½ bushels, which, it will be noticed, was a marked falling off in production from the average of the preceding year (72½ bushels).

On this point the report says: "The continued cold, wet weather following planting, acted in a detrimental way to the growth of the corn and in some rows only a partial stand was secured."

Still, nothing is said in favor of this Silver King corn. Also this report does not give the amount of seed corn produced.

Report Shows Increase.

The report for 1906 says: "It is encouraging to note that the proportions and average yields of seed corn and marketable corn have been materially increased over those of a year ago."

The report also states that the average yield was 75 bushels per acre, which, it will be noted, was considerably more than the preceding year, and slightly greater than 1904.

This report also says: "Not all the increase is due to the selection of seed, as the growing season in 1906 was more favorable and the plots were on better soil. It is noticeable, however, that the increase of seed corn is greater in proportion than that of the nubbins."

Again I quote from this report: "The results for this year encourage the belief that constant selection of the best ears from the best rows of the breeding plot will materially increase the productiveness and improve the quality of our seed corn."

This, of course, is something that everyone who is at all acquainted with the subject knows, and it is a universal practice.

Planted in Better Land.

While the report claims a slight increase in yield, it is to be noted that it states that the corn is planted in better land. Still there is no claim as to the superiority of the Silver King corn.

From the report of 1907, it seems that the experimenters planted the general cornfield of eighteen acres of tested seed from the best ears in the previous year's crop. They state that the average yield was 63.8

bushels of shelled corn per acre, which, it will be seen, was going backward from the average of 1906 (75 bushels) and also from the average of 1904 report of 72½ bushels.

It is surprising that this report gives no explanation of this falling off. The only thing it has to say on this subject is that the season was backward in the beginning, but afterward they had good corn weather and the crop matured in good time.

The report also states that they had an average stand of three stalks to the hill.

I again notice in this report reference to the great variation in the production of different rows, running from 83 pounds to 269 pounds, but notwithstanding this variation the claim is made that "the difference in yield of seed corn and total yield is not so great this year as in previous years' tests, as through the selection method of breeding practiced the corn has become more uniform and stable in character."

This report says an average yield of seventeen per cent seed ears was secured. As the amount of seed corn mentioned in the 1904 report averaged practically the same as this year, it will be seen that there is nothing in the statement just quoted of the corn having become more stable.

Nothing on Experiments.

In the 1908 report there is not one word of any experiments with the Silver King corn.

From the foregoing statements in the university reports it seems to me perfectly evident that the University of Wisconsin has not discovered anything particularly remarkable about the Silver King corn, as there is not a particle of evidence anywhere that any

special advantages to the State from this corn are claimed. The only thing the authorities claim about the improvement in their breeding of the corn is that it has become more stable and that it gives more satisfactory results by producing a greater percentage of seed corn, but, as I have already shown, this statement is not correct.

So there is absolutely no basis whatever on which this university can go before the public with this corn.

It is perfectly evident, from the yield, that the university not only has not improved this corn, but that it actually has gone backward.

In order that the reader may see this matter more clearly I give the following statement:

	1904.	1905.	1906.	1907.
Average yield per acre, bushels	72.5	58.5	75	63.8
Percentage of seed corn	16.5%	...	...	17%

No Comparison Made.

In none of these experiments that the university has made does it compare this Silver King corn with any other corn. Consequently I do not understand how it can claim any merit for it. Without comparisons there is no basis for judgment as to its value.

Soon after these articles appeared in the *Record-Herald* I wrote to President Charles R. Van Hise, of this university, requesting that he give me clear and definite information as to how this result in great increase in production of corn was brought about, and in answer I received a letter from Prof. R. A. Moore, of the department of agronomy at this university, in which, after describing the method of breeding corn, which is the same as mentioned in the reports of the

experimental station, and in any event has no bearing on the case, as what we want are results, he says: "We find that we have been enabled to nearly double the yield of corn by this process of breeding," and this is all he has to say on the subject of the alleged great increase in yield!

As a matter of fact, instead of this statement that they have improved the corn being true, their reports, as I have already mentioned, show that they have gone backward in breeding the corn.

The college authorities boast that some of the seed was sold at from $3 to $6 a bushel. If this were true it certainly was a great swindle to the farmers, and must have resulted from the university's false statements in regard to its merit, as from their own experience the Silver King is not worth anything as a seed corn.

These various reports have considerable to say with regard to what the members of the experiment association are doing with this corn, but as the whole matter rests on the question of what the university has done in the way of breeding and improving this corn, the question of what the experiment association has done is entirely irrelevant.

A Backward Operation.

As a matter of fact, if the association's experiments with this corn are the same as the university has been making, it has been a backward operation anyway. If the university, which has been paying close attention to this corn, has gone backward, what could be expected from farmers, who paid but little attention to the subject?

Also, with the small amount of land that this university has for experimental purposes, it certainly could not produce any considerable amount of seed to distribute to these people anyway; that is, the seed from eighteen acres would not go far toward supplying 175,000 farmers.

It is quite clear from all the information we can get on this corn question that there is an opportunity for the experimental stations of universities to do some good in the way of improving the corn crop, for the reason that with corn, like some other field products, there is an immense variation in the yield of certain varieties in certain parts of the country. This is quite evident from the enormous number of varieties of corn that are on the market. Corn that will do well in one section often will not do well in other sections.

I have been told of a case where Virginia corn was brought into the State of Kentucky and produced 150 bushels to the acre. But this same corn in other parts of the South did not do well at all.

This being a very important matter, and the uncertainty of corn being so great, I maintain that an enterprising experimental station would have the members of its experiment association test every variety of corn that is prominent anywhere, and would buy the corn by the carload and have these farmers test it in different parts of the State. This is the way a business man would go about a matter of this kind; but apparently these people have done nothing at all in this way.

What Corn Does Well?

So far as I can see from these reports of the experimental station at Madison, they have done nothing in

the way of ascertaining what kind of corn does well in that State, or in any particular part of the State.

They have made no systematic or businesslike effort to develop this most important subject.

I maintain, therefore, that the University of Wisconsin, instead of being entitled to any credit for helping the farmer on the corn question, has been exceedingly neglectful of its duty to the State. This is certainly what the experimental station is for and it is its most important duty.

If the corn crop of the State has been improved it is not due to anything this university has done, but more particularly to the enterprise of the seed-corn men.

It seems to me that when corn shows deterioration and does not improve under close, systematic breeding, it would be folly to go on with it.

Regarding Barley.

As to what the university has done to improve barley, I would say that the further I look into this subject, the worse the showing for it.

From all reports there is practically no difference between the Mansbury and the Oderbrucker barley. The reports show that Mansbury barley was introduced into Wisconsin from Germany in 1859 by Dr. H. Grunow, and in 1861 was introduced extensively. Undoubtedly this barley has been cultivated to a great extent for many years and it would seem strange that the college experts should neglect the old-established barley and then take it up under a new name. It looks as though they thought there was no glory in introducing the old barley under its old name, and so were trying to get some glory by palming off the old barley under a new name as a new discovery. This

is a common trick of merchants, but I did not suppose that educators would resort to this sort of trickiness.

The Oderbrucker barley was imported from Germany by the Ontario Agricultural College and was obtained from that source by Professor Moore. The Oderbrucker and the Mansbury are so nearly alike in every particular that an authority in the *American Brewers' Review* recommends the dropping of the name Oderbrucker altogether.

Censure Is Merited.

It seems strange that the university has been all these years discovering the merits of these two barleys, and instead of giving it credit for putting them before the public at this time it should be severely censured for not having done so before. I might say that I have endeavored to find out from the authorities at Madison what they have done to introduce this barley at the present time. The only thing I have been able to ascertain is that they have coöperated with about 500 out of 2,500 members of the Wisconsin Experimental Association.

The university has published no literature on the subject, and when we consider that there are about 175,000 farmers in Wisconsin, you can see that by aiding only one out of 350 what it has done toward introducing this barley is only a trifle, even if it had any special merit.

Long Used by Farmers.

But the fact being that the Oderbrucker is identical with the Mansbury, which these farmers undoubtedly had been using for a great many years, it will be readily understood that the university claims to hav-

ing done anything in the way of improving the barley of the State are absolutely without foundation.

Now, as to the real merit of Oderbrucker barley, I would say that up to this time the Wisconsin product has no standing as a high-grade malting barley. The largest maltster in the State of Wisconsin has never adopted it and says in a letter that I have that he is now experimenting with it. Mr. Busch, of the Anheuser-Busch Brewing Company, who is always demanding the best barley that he can get, is not using the Wisconsin Oderbrucker.

To sum this matter up, I would say that the University of Wisconsin has practically done nothing whatever to improve the barley crop of the State; in fact, there is no evidence, so far as I have seen, that this university has made any improvement in breeding anything, nor have I seen the claim made that this university is trying to be of any service to the State in any department except that of agriculture.

CHAPTER XII.

THE RURAL SCHOOLS — A SADLY NEGLECTED FOUNDATION.

Regarding the assertion (quoted on page 303) that the entire State of Wisconsin "goes to college," let us see what the facts are; what is the condition, for instance, of the country schools of that State.

I am fortunate in being able to present these facts, as given to me by a gentleman amply qualified to speak on this subject — one who has been a pupil and a teacher in the country schools of Wisconsin, principal of a graded and small country high school, and for six and a half years county superintendent of schools.

I asked him for information (facts, not opinions) as to the condition of the rural schools in his State, the cause or causes of these conditions, and the average amount of education received by the farmers' boys in the district schools of Wisconsin. The substance of this interview follows:

A Strong Array of Facts.

After referring in a general way to his work and his facilities for extended and close observation, my informant said:

> It is no secret that in Wisconsin we are a long, long way from the ideal country school, and the reason can be expressed in one word — *neglect*. In the past, and it is largely true to-day, the country school has been neglected by all who should have given it their fostering care.

But the neglect of the country school by State and educators is trivial compared with the almost criminal neglect of it by the farmers themselves. To one who hasn't seen it it is inconceivable.

He then showed how niggardly the farmers have been in providing for their schools, how they have increased their school year and its requirements just enough to get their share of State money, and how they have searched far and wide in their efforts to get, not the best, but the cheapest teachers. On this point he cited the following typical example:

I recall a very striking instance during my first year as county superintendent. Previously, a certain district had been having seven months' school and had paid $20 for the fall and spring terms of three months, and $25 for the winter of four months — a yearly salary of $160.

I was ashamed to have a teacher under my supervision at such a salary. After directing a young woman of experience to apply, I promised her that I would endeavor to keep all other applicants away, so that she could fight out the salary question unembarrassed by competition. She demanded the exorbitant sum of $30 a month. They couldn't afford it; they would wait, and they did. The summer passed; no applicants. Fall came; they searched far and wide, but most schools had opened and all who wanted positions had them.

Saving $5 a Year on the Teacher.

Finally, about October 1, they compromised on $25, fall and spring, and $30 for winter. To make the burden as easy to bear as possible, they took one month from the winter term and added it to the spring and fall terms, and thus saved $5.

I presume you think that this was some small, poor district far removed from civilization. Far from it. It is two miles from a thriving city; land sells from $100 up; while the assessed valuation last year was $200,000.

What kind of a school board was it? The clerk was a dealer in fancy blooded stock, which annually carries off premiums at the State and county fairs, and the other members were like unto him.

A Condition Far Too General.

I am ashamed to state in how many districts in Wisconsin at that time, and even now, the same experience might be duplicated in all its essential features.

In connection with the statement that "the schoolhouses have been neglected in a manner to bring the blush of shame to any self-respecting citizen," and describing one of these buildings as a type of the worst results of such neglect, he thus pictured the teacher in charge:

Her speech was ungrammatical, her preparation having extended but little beyond the completion of the course of study she was now trying to teach. I never saw any one who was working more earnestly, according to the light she had. She drove three miles each morning, took care of her horse, dug the wood from the snow, built her fires and swept — as far as possible — and for six hours strove to make those girls and boys into efficient citizens. Then she drove home to prepare her lessons for the morrow. And for those services, properly and faithfully rendered in educating future presidents, she received the munificent sum of $27.50 a month, a yearly salary of $192.50.

The teacher's uncle was a county officer and an ex-teacher, and to him I related my discovery. He smiled and said: "It's just the same, then, as it was twenty-five years ago when I taught there and wore my overcoat during school hours to keep from freezing."

Such conditions can be matched in every county in Wisconsin. In the new counties where buildings have been constructed recently, they, of course, are in fairly good condition. My district contained three like the one I have described, while several more were nearly as bad.

Every county superintendent with whom I have ever talked has practically admitted that he has had just such cases.

AN INEVITABLE COMBINATION.

It will be seen that poor buildings, inadequate equipment, a short school year and low salaries usually go together.

After referring to the school grounds as being too small, the absence of beautifying buildings and grounds, and the fact that more than eighty-five per cent of the country teachers are their own janitors, he added:

Such conditions are much more prevalent than they are supposed to be, than they ought to be. There is no use deluding ourselves. There are many districts where few or none of these conditions exist, but it is safe to say that sixty to seventy-five per cent of the country teachers to-day are laboring under conditions nearly as adverse.

The State superintendent reports 37 teachers in 1908 who received less than $20; 526 who received not to exceed $25; 1,820 not to exceed $30, and 2,691 not to exceed $35; a total of 5,074 who received $35 or less. It is safe to say that the vast majority of these were country teachers. If so, there were not more than 2,000 teachers in all who received more than $35.

Consider the work, the conditions for it, and the remuneration, and is it any wonder that there are practically none in the country schools to-day except the young, the untrained and the inexperienced?

Just here let me mention one effort of my own to get at these country-school conditions. The Wisconsin Legislature of 1905 provided for a rural school inspector and specified his duties, part of which were to report to the State superintendent of public instruction "the conditions found in the schools and districts inspected."

Suppressed Reports.

I wrote to Mr. C. P. Cary, State superintendent, asking for a copy of what this rural inspector had reported. The letter received from Mr. Cary did not give me the slightest information on this point, and I can get none from any other source. Why have these reports not been published? I can come to no conclusion other than that this inspector's reports have been suppressed because they showed conditions so bad that it would be a disgrace to the State to make them public.

In confirmation of this conclusion, I asked the gentlemen interviewed here about these reports, and he answered: "Any one who knows the man who held the office of inspector during the period covered by these reports knows that he found conditions, that he formed conclusions, that he had remedies. Why were they suppressed? Political cowardice is probably the answer."

Why do these disgraceful conditions exist and persist? Who is to blame for them?

My informant answered, placing the blame partly on the State at large, to a considerable extent on the University of Wisconsin, and most of all on the farmers themselves. He said:

> We have been so busy building, maintaining and blindly worshiping the so-called higher institutions of learning, that we have forgotten the school of the masses, the school of our fathers, the school where the real men, "the live wires," of to-day are supposed to have laid the foundation of their careers. We have lavished money upon our great university, dealt liberally with our nearly three hundred high schools, but have been miserly in our treatment of the country school.

COMPARED WITH THE PRICE OF A COW.

More money was recently expended by the university in the purchase of a cow for the dairy farm than was appropriated the last two years for all the professional literature and apparatus of the teachers' department.

This department, by the way, is supposed to play a direct part in the making of teachers for the country schools. To continue the interview:

The farmer has been too stingy to provide a first-class school. He has had the poorest when he should have had the best, because he can have the best for the least money. He has no expensive site or building to purchase and maintain. He can practically put all his money in a teacher.

Theoretically, the farmer believes very strongly in education; practically, he doesn't, for what to him seem very good reasons. He does not take kindly to giving his boy a university education and having him drift off to the city, there to contribute his brawn, his brain, his honesty, to the city's cause and accumulate but little money, while his neighbor's son, whose education did not exceed beyond the fifth grade, has remained on the farm and accumulated his share of this world's goods.

DRAWING THE BOY FROM THE FARM.

If every time a boy secures an education he is lost to his parents and the farm, the farmer naturally concludes that education is to blame. Between an ignorant boy on the farm and an educated boy away from the farm, he prefers the former.

The State, the educational profession and the farmers are reaping as they sowed. Again to quote my informant: "They sowed neglect and niggardliness, and they reaped a school they themselves could not defend."

How much of an education is the country boy receiving in such a school as his father has provided?

"An easy, an interesting question, but, unfortunately, there is no data available," answers this county superintendent, after making a diligent inquiry. However, from the results of this inquiry, he is able to show that not to exceed forty per cent of the country children reach the sixth grade, and that only one third of those who enter this grade complete the course.

So far as statistics have been secured, it would appear that the average farmer's boy receives about one-half the education provided for him in the country schools, such as they are. And the gentleman quoted assures me that "it is entirely safe to say the efficiency of our country-school plant is not more than fifty per cent of what it should be, because of irregular attendance. Half of what we spend is wasted."

If the farmer's lad is getting not more than an average of half what these exceedingly poor country schools provide in the way of education, and the efficiency of half of this is lost, perhaps some of the higher mathematicians of the university at Madison will inform us just how much real education he is getting.

Education Given Farmers' Children.

I quote from another county superintendent, who thus summarizes the education received in the country schools of Wisconsin — whose university is "literally teaching the entire 2,500,000 population of the State," according to Mr. Leichliter:

> Their (farmers' children) attendance at school is scarcely one hundred days a year and the instruction, for the most part, inefficient. Barely two-thirds advance beyond sixth grade. They are neither capable nor inclined

to read, and, furthermore, they are required to labor so strenuously that there is little time for reading; they are being educated from the farm. There are very few farmers who even know that there is any "literature of their calling," and these few don't know how to get it, and wouldn't read it if they had it. The farmer needs a collegiate course in general and the short course in agriculture in particular, that he may read the "literature." Then, with the aid of the Century Dictionary and Encyclopedia Britannica for reference, he will get a little. The university is spending its energy in preparing young people to become high-school teachers, engineers, traveling salesmen and night clerks in hotels. Its high-school domination does tend to give the farmer boy and girl poorer teachers, but the latter proposition affects them little, if any. The conditions on our farms are such that the young people who have physical strength, pride and ambition make their "get-away" just as fast as God will permit.

This county superintendent, by the way, is even more severe than I have been in criticising the sort of "literature" sent out by the agricultural department of the University of Wisconsin, the quality of education given to the farmers' children, and the ability of the farmers to understand what the professors at Madison prepare for them.

Other States Far Ahead.

Thus we see that, notwithstanding the boasts of its university, Wisconsin is sadly behind the times in the way of genuine public education. It lags far in the rear of several States. North Dakota, for instance, has a law that places the minimum wage of country school teachers at $45 a month for the second grade. Teachers of a higher grade must receive more. If a district is not able to pay this amount, it is required to draw upon the State treasurer for the difference.

Other States having a minimum wage law are: Indiana, West Virginia, Pennsylvania, Maryland and Ohio. All of these States are far ahead of Wisconsin, yet their universities are not bragging about "teaching the entire population."

The District Schools of Illinois.

That this deplorable condition of the schools furnished for the common education of farmers' children is not peculiar to Wisconsin is evident from two addresses delivered by Professor Davenport, dean of the Illinois College of Agriculture, the one entitled "Education for Efficiency," the other, "The Next Step in Agricultural Education." And to this I shall add the testimony of Mr. A. F. Nightingale, superintendent of education for Cook county, Illinois.

Professor Davenport condemns the old-fashioned colleges, with nothing but classical courses, but considers the ordinary college a most desirable thing when it is combined with industry and the practical affairs of life.

He believes that the education should be carried to the pupil; that young men and young women should be able to attend school and still be at home nights. He argues this is practical for high schools, but not for colleges. Apparently in the latter there is no help for the boy and girl being taken away from home. Mr. Davenport's main argument seems to be that all subjects should be taught in the same school, whereas in all other lines the great idea is to "specialize."

"Barking" for the "Side Shows."

Dean Davenport has gone in head over heels for what President Hadley has called the "side shows"

that are eating up the main circus. The higher educationists appear to have a strong desire to work in the "side shows" of education. They recognize that the main show is played out and that it is only by the aid of the "side shows" they can hold their positions.

So the chief effort now is to make these "side shows" seem to be not only most important, but that without them the country will "go to the dogs." This is the latest device for "pulling the wool" over the public's eyes.

The educational "side-show" advocates overlook the fact that the country has got along very well up to the present without their aid, and that the people who are most interested in this subject of education — real education — don't seem to be attracted by the "side-show barkers." The school faddists seem to think that they know better what the public needs than it does itself, and they are determined to furnish it, whether the public wants it or not.

Among other things, Dean Davenport insists on maintaining the four years' course in agriculture. I can not conceive how he can imagine that this four years' course — which means practically twelve years more of schooling than the average farmer gets — is going to make it pleasant or desirable for the farmer's boy to go back to milking cows, feeding pigs, cleaning stables, and the other drudgery of the farm. Not only has the lad been spoiled for these necessary tasks, but for any other sphere of useful life.

From Professor Davenport's point of view there is pressing demand for these "side shows," especially that of agriculture. I question the correctness of this assertion, as only one in every 130 farmers' boys goes as far as the county high schools. Thus there would

be only one in 130 who could consistently make a demand for an agricultural college course. Is it for this one boy in 130 that Mr. Davenport recommends that the county high schools teach "soil physics" and "soil fertility," and maintain "laboratory fields in crop production"?

How under the sun does he expect that boys who have had only four years in the none too good district schools can understand these things? From these subjects not even educated farmers can get any benefit.

Working at the Wrong End.

Dean Davenport certainly is working on the wrong end of the educational problem, and the gross inconsistency of his position is apparent when we consider the vast difference between the condition of the country common schools and those he so strongly favors.

The facts are simply these: The farmers' boys, instead of getting the high school and college schooling he claims they ought to have, are not getting on the average more than four years of district-school education. He seems to be disgusted with the high schools for being preparatory schools for colleges, instead of serving the public directly; but he says not one word throughout these addresses about the deplorable and inefficient condition of the district schools. He is deeply solicitous for the one boy that gets as far as the high school, but has no sympathy for the 129 poor devils who get but a little district-school education.

It is the same with all the higher educators. They are willing to sacrifice an enormous amount of the best blood of our youths to maintain their position, and are taking thousands of young men, who might be employed at something useful, and making miserable

failures of them, simply that indifferent school teachers may hold their jobs.

After looking at this fancy picture drawn by Dean Davenport, of what he considers education should be, "higher up," let us glance at the condition of education "lower down," as painted by Mr. Nightingale, superintendent of schools for Cook county, Illinois. Here we have the difference between theory and practice.

TESTIMONY OF A. F. NIGHTINGALE.

In his report covering the period from July 1, 1902, to June 30, 1904, Mr. Nightingale says:

> Here is a problem which well-nigh defies solution. Consecrated to the work as one may be, he finds that the most herculean efforts, the largest possible expenditure of thought and time, however rich his equipment, however extended his self-sacrifice, however honest his plans and however determined his purpose, will not bring those results which he so ardently hopes to see and which are the inspiration of his thoughts by day and the burden of his dreams by night.
>
> To the farmer the recurrence of the seasons means the recurrence of seed-sowing, and through his labor and watchfulness and incessant care, with the added helps of the rains that fertilize and the sunshine that ripens, there comes a bountiful harvest.
>
> The seeds of unremitting effort sown to produce a satisfactory rural school harvest, however, find germination very difficult. The rains seem to chill and the sun seems to wither them. * * *
>
> There are still so-called school buildings in Cook county, as I presume in every county, which would make neither good sheepfolds nor excellent dog-kennels. They are antiquated, shabby, shop-worn, obsolescent and obsolete. They never were fit dwelling-places for human bodies or human souls for six hours in a day. * * *
>
> Many schools are without supplementary reading,

without libraries, without maps, without charts, without well-chosen, well-graded and uniform text-books, without anything to encourage and uplift or inspire.

Mr. Nightingale also points out in strong terms the shortsighted and niggardly policy that has prevailed in the employment and treatment of teachers in these rural schools. He says in substance that not only are the salaries ridiculously small ($40 to $45 a month for only about seven months in the year), but that the teachers have to board at very inferior places among the farmers, often have to walk quite a distance to and from school in all kinds of weather, and are required to perform all sorts of drudgery, such as cutting the kindling, carrying coal or wood, building their own fires and cleaning their own schoolhouses. He adds:

Is it any wonder that only the inexperienced and incompetent or, in other words, the mediocre among teachers, will accept these positions, and that they seldom remain in one place more than one season?

In Mr. Nightingale's next report (July 1, 1904, to June 30, 1906), he takes the ground that these schools have continued to go backward, that the trustees are striking harder bargains with the teachers, and that the teachers are of less account and their surroundings more discouraging than formerly. He continues:

If the farmers or the men in any kind of business who hire teachers should till their fields and manage their affairs as they supervise the schools, they would reap in the autumn time less than they sowed in the springtime, and the balance on their ledgers at the close of the year would be on the wrong side.

Speaking of the country children, he asks:

Why is it that the schools which they attend, with notable exceptions, seem to repress rather than impress,

to dull rather than sharpen their wits, and to leave them at the end of the year with the merest modicum of interesting and profitable knowledge? There are many reasons, and, sad to say, potent reasons.

He then calls attention to the defects already mentioned, such as poorly paid teachers, their short tenure, etc., and adds:

I invite the attention of every one concerned in these rural schools to these startling facts. From them I can draw but one conclusion — never, never, never, until this slight tenure of office is changed radically, will these schools along the countryside, in this county or any other county, rise above the low level of a most discouraging mediocrity.

In his next and latest report (July 1, 1906, to June 30, 1908), Mr. Nightingale has considerable more to say on this subject, the substance of his remarks being that, with very few exceptions, no progress has been made in the rural schools, which, as he says truly, is "exceedingly discouraging."

A SUGGESTION TO RURAL SCHOOL AUTHORITIES.

In view of the conditions just shown, I think if the people who have the rural educational matters of Wisconsin and Illinois — and doubtless other States — in hand were honest in their treatment of teachers, they would post in their Normal schools something like this:

> The State is greatly in need of teachers for rural schools and offers the following terms to young women to become teachers:
>
> They must pass ..... examination, and also must have six months' practical training in teaching. Salary for the first year to be from $20 to $25 a month, for seven months of the year.
>
> Besides being qualified teachers they are expected to be persons of character, and also must have the ability to maintain order and discipline in the schoolroom.
>
> They will be expected to clean the schools, cut kindling, make fires, and see that the school is properly ventilated. They will also shovel snow, etc.
>
> They can usually find board near the schoolhouse at about $3 a week. They will be expected not to complain at having to associate with farm-hands and spend their evenings in the kitchen.

I understand that district-school boards find it difficult to get enough teachers for these schools. If this is so, surely the foregoing liberal offer ought to bring plenty of material, in view of the magnificent reward offered for the time and money spent in acquiring an education.

CHAPTER XIII.

THE CONCLUSION OF THE WHOLE MATTER.

To sum up this whole matter: All general schooling above the public grammar schools is worse than useless. This higher schooling not only does not improve a person for business, but it does not strengthen or develop his character. It has just the opposite effect, disqualifying him for a business career, weakening his moral structure, and highly demoralizing him in every way.

As for the technical and special schools, I am greatly surprised to find that all these branches of education are so deficient, wasteful, and of so little use, as my investigations have shown to be the case. No one with any practical knowledge of the subject will claim that there is anything but a limited use for them. It is safe to say that we could get along perfectly well with but few of such schools, and that ninety per cent of all the enormous expenditure of time and money demanded by higher education is worse than wasted.

On the other hand, glance around and see what has been accomplished, and still is being done, by the practical men who have not had any of the artificial aid of the higher educators. These are the men, it is

safe to say, who have increased the productiveness of the world at least ten times, and who have added to our enjoyment of life in proportion at least equally great. These are the men who have done things, not talked about doing them or tried to show how they should be done.

Look, for instance, at what the practical man, the inventor and the manufacturer, have done for the farmer. Every implement and machine he uses has come from the men who work in and manage factories. How would the farmer like to go back fifty years and be stripped of all these labor-saving devices? Let him compare what the practical man has done for agriculture and what the agricultural colleges have done.

The college men talk as though they knew all about every other man's business, and that they could manage affairs better than the business men themselves. The college professors and teachers are prepared to give advice on all subjects. As $2,000-a-year teachers they tell us how to turn out $5,000- and $10,000-a-year business men.

Isn't it a bit strange that it never has occurred to these smart college fellows to go into business for themselves? Why draw a small salary for telling young men how to draw big salaries if you are capable of drawing the big salary yourself?

The business world is sadly in need of men of brains and talent. These things bring a large premium, and every prominent business man is on the alert to secure them.

I believe I have shown clearly that higher schooling does not make either brains or ability. And as these are the only things that count in any of life's activities, what use can we have for the higher schools?

As these schools, then, are not needed, they can not be anything but a curse, as one English writer calls them.

It is conservative to estimate that the expense of higher education to this nation must be at least $100,000,000 a year. And this enormous sum is literally thrown away, much to the injury of the country and its people.

For this vast waste of money means blood drawn right from the people, blankets taken from their beds, food from their tables, coal from their cellars, clothing from their backs — all in the line of sacrifice on the altar of higher education.

I think it is high time that the American people realized this, for I believe if they once became fully aroused on this matter, they would take steps to compel the higher educators to go to work and earn an honest living. If the professors can tell us how to raise corn or build bridges or dig tunnels or run factories or manage stores, then in the name of common sense let us give them a chance to show us how these things should be done.

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